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COMMERCIAL STANDARDS MONTHLY

BUREAU OF STANDARDS
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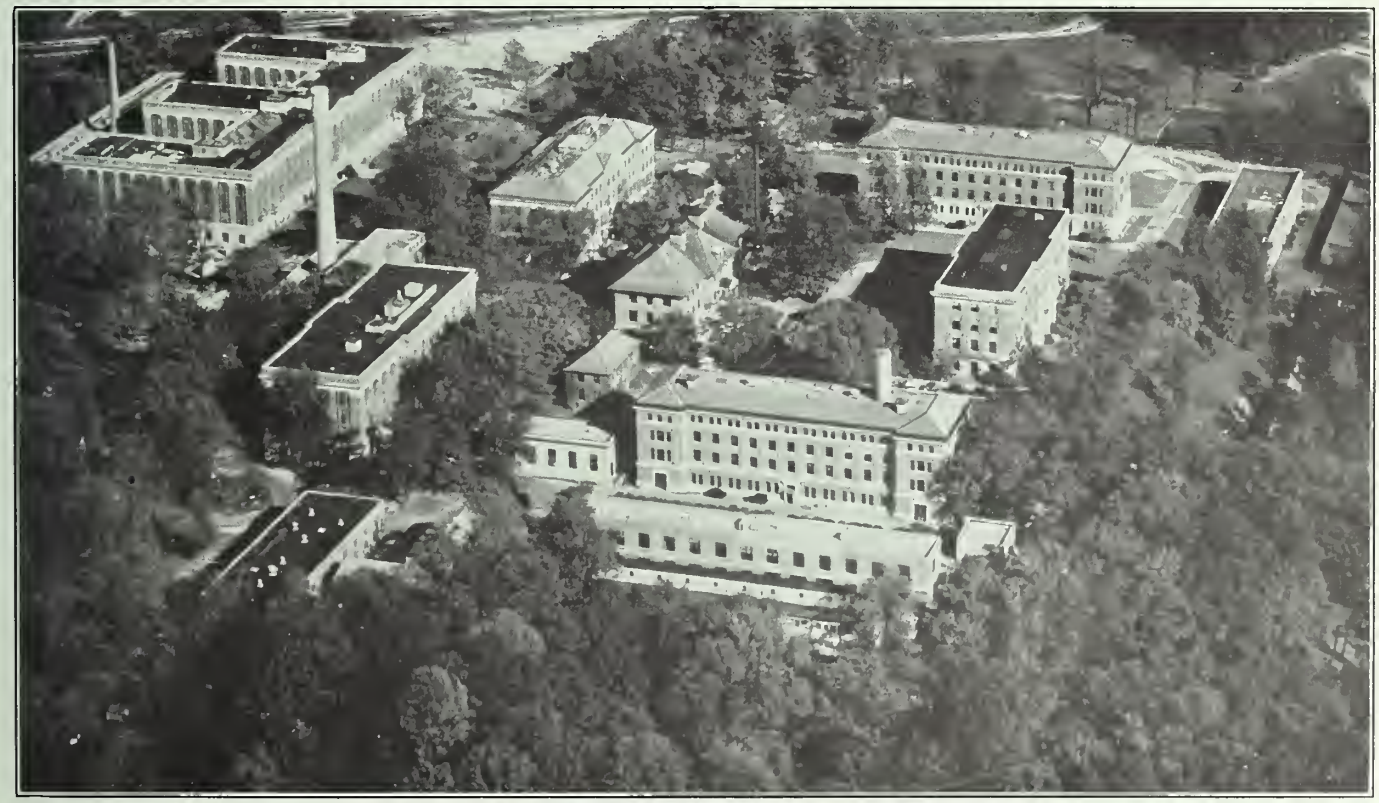
A Review of Progress in Commercial Standardization and Simplification



AIRPLANE VIEW OF NATIONAL BUREAU OF STANDARDS

ISSUED BY THE NATIONAL BUREAU OF STANDARDS OF THE UNITED STATES DEPARTMENT OF COMMERCE, WASHINGTON, D.C., U.S.A.

Vol. 7, No. 2 AUGUST, 1930

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U. S. DEPARTMENT OF COMMERCE

R. P. LAMONT, Secretary

NATIONAL BUREAU OF STANDARDS

GEORGE K. BURGESS, Director

COMMERCIAL STANDARDS MONTHLY

S. F. TILLMAN, Editor

DIVISIONS OF THE COMMERCIAL STANDARDIZATION GROUP

DIVISION OF SIMPLIFIED PRACTICE, EDWIN W. ELY.

The division of simplified practice was formed in November, 1921, to provide a clearing house or centralizing agency through which the manufacturer, distributor, and consumer groups could meet to discuss their common problems and decide upon eliminations which would prove of mutual benefit to all concerned. The activities of the division are purely cooperative in character. It orders nothing; it dictates nothing; the initiative must come from business itself. It has no regulatory nor police powers to enforce adherence to the simplified-practice recommendations that industry develops under the auspices of the United States Department of Commerce. Its chief function is to serve as a neutral meeting ground for the purpose of bringing together producers, distributors, and consumers, whose aims are sometimes divergent and possibly antagonistic, and who would be unwilling to cooperate, except through some unbiased central agency. Following the approval of the tentative simplified-practice recommendation by a general conference of all interested elements thereof, the project is then presented to the entire industry by letter referendum for its approval and written acceptance, the publication and indorsement of the recommendation on the part of the Department of Commerce being dependent upon acceptance of the program by at least 80 per cent, by volume, of the manufacturers, distributors, and users concerned.

BUILDING AND HOUSING DIVISION, J. S. TAYLOR.

The division of building and housing cooperates with business, technical, and professional groups in practically all its undertakings on building and housing. Its work to modernize building codes and to encourage improved standards for the quality of building construction promotes the practical application of the latest development in design and use of building materials. This division was also formed in 1921.

In furthering home ownership, an effort is made to develop an enlarged, steadier, more intelligent, and more discriminating demand for soundly built dwellings, the largest single class of buildings which the construction industries provide. The division also cooperates with many business and professional groups in efforts to distribute building activity more evenly throughout the year, and to secure less fluctuation from year to year. The work on city planning and zoning has in mind the broad objective of buildings made more useful because well located with respect to other buildings, a well-coordinated street system, and appropriate public works. Good city planning and zoning likewise encourages stability in land values and property uses, and thereby contributes to the demand for durable structures.

DIVISION OF SPECIFICATIONS, A. S. MCALLISTER.

The duties of the division of specifications are to promote and facilitate the use and unification of specifications. In doing so it carries on activities involving cooperation with technical societies; trade associations; Federal, State, and municipal Government specifications making and using agencies; producers, distributors, and consumers; and testing and research laboratories. The cooperation with technical societies and trade associations includes ascertaining the standardization and specification promoting activities of these organizations, and bringing to their attention the work being done by the commercial standardization group. The cooperation with governmental agencies and other consumers includes the bringing of Federal specifications and commercial standards to the attention of the maximum number of producers and the maximum number of users of commodities complying with these specifications and standards, thereby assisting in broadening the field of supply. The cooperation with producers involves the compilation and distribution of lists of manufacturers who have expressed their willingness to certify to purchasers, upon request, that material supplied by them on contracts based on certain Federal specifications or commercial standards comply with the requirements thereof. The cooperation with distributors involves bringing to their attention the benefits to be derived by them as both buyers and sellers from handling nationally specified, certified, and labeled commodities. The division prepares the directories of governmental and nongovernmental testing laboratories; the Directory of Specifications; and is working on an encyclopedia of specifications, the first volume of which, Standards and Specifications in the Wood-Using Industries, has been issued. It also aids in preparing the Standards Yearbook.

DIVISION OF TRADE STANDARDS, I. J. FAIRCHILD.

The commercial standards unit, now known as division of trade standards, was created on October 1, 1927, for the purpose of aiding those industrial and commercial groups desiring to establish standards of grades, quality, or measurements for their products or their purchases on a purely voluntary basis.

The division functions only at the direct request of the industry concerned. Its procedure is similar to that of the division of simplified practice, except that at least 65 per cent of the industry, by volume of annual production, must accept the commercial standard in writing before it is published by the Department of Commerce. A certification plan is applied on request as a means of increasing the effectiveness of such standards. Provision is made for regular revision of the standard through the appointment of a standing committee to consider periodically any necessity for revision of the standard, in order that it may be kept constantly compatible with progress in the industry.

Except where otherwise indicated, for further information address

BUREAU OF STANDARDS

WASHINGTON, D. C.

COMMERCIAL STANDARDS MONTHLY

A Review of Progress in Commercial Standardization and Simplification

VOLUME 7 WASHINGTON, D. C., AUGUST, 1930 NUMBER 2

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AN INVITATION TO VISIT THE BUREAU OF STANDARDS

An interesting fact in the growth of the bureau is the steady increase in the number of visitors. From all over the world experts come to see the work in progress in many specialties. Not alone the experts but in growing numbers many of our people visit the bureau from a public-spirited desire to acquaint themselves with its research work. All visitors, from the newspapermen, who have called the bureau a "house of wonders," to the specialists, who use its services, are welcome, for it is their bureau in a very real sense. They are the owners of the business and its beneficiaries. The annual per capita cost of 2 cents which the average citizen pays toward the operation of the bureau yields returns sometimes a hundredfold or a thousandfold. How science turns wastes into profits, increases the useful life of materials, adds new efficiencies to industry, advances new arts, such as aviation and radio, by research and discovery—these are to be seen first-hand in the scientific and technical laboratories of the bureau.

A cordial invitation is extended to all citizens interested in scientific progress to visit the laboratories of the Bureau of Standards when in Washington. A personally conducted trip is organized at 2.15 p. m. daily except on holidays. Special trips for groups may be arranged at other times by writing to the bureau in advance. The bureau's illustrated Visitor's Manual may be had for the asking. This lists the work in progress and gives an airplane view of the ensemble and a brief statement of typical discoveries and inventions which have been notable, basic contributions to radio, aviation, and other modern arts and industries.

GEORGE K. BURGESS, *Director.*

THE INTER-AMERICAN CONFERENCE ON AGRICULTURE, FORESTRY AND ANIMAL INDUSTRY

By A. F. WOODS
Director of Scientific Work, U. S. Department of Agriculture

AGRICULTURAL and research technicians from the 21 American republics, members of the Pan-American Union, will meet at the invitation of the United States Government in the first Inter-American Conference on Agriculture, Forestry, and Animal Industry at the Pan-American Union in Washington, D. C., September 8 to 20, 1930. A series of round table discussions will be held to consider problems involving the fundamental principles of scientific research, standardization of methods of applying those principles to agriculture and to formulate a permanent program of inter-American cooperation for the systematic conservation and utilization of natural resources, development, promotion, and protection of agricultural industries.

As bases for the discussions, a series of about 50 semitechnical papers have been prepared by leading specialists to be printed in three languages for the information of the delegates. These articles deal with the making of surveys and inventories of soils, forests, pastures, diseases, and insects; classification and utilization of land, soil erosion, and conversation; forestry; animal industry, breeding, nutrition, and sanitary control; plant industry, breeding and selection, introduction of foreign plants, seed testing, forage crops for warm climates, plant diseases and insect pests and their control, and cereal, sugar, cacao, coffee, rubber, cotton, tobacco, and vegetable crops; agricultural education, demonstration stations, and the proposed establishment of an inter-American agricultural tropical research station; agricultural economics, competition, statistical cooperation, marketing, transportation, standardization, and farm management; and statistics of livestock, areas, production, imports and exports of crops.

Any program of continuing inter-American cooperation in scientific research as applied to agriculture will necessarily involve standardization in definition, in methods of research, in reporting results, and in the application of research methods to specific problems.

The coming conference on agriculture is the result of a resolution adopted by the Sixth International Congress of American States at Havana, in 1928, the initiative of the governing board of the Pan-American Union, the appointment by the Pan-American Union of a national cooperating committee in each of the American republics, and the action of the State Department in obtaining the necessary sanction and appropriation from Congress.

The meeting of minds, discussions, comparison of experience, conversations, personal contacts and mutual understanding of specialists from the 21 American republics can not do otherwise than promote standardization, because in the domain of scientific research international boundaries are disregarded.

GOVERNMENT SPECIFICATIONS FOR DRY CELLS

Specifications Based on Research Provide for Necessary Performance of Cells

By G. W. Vinal, *National Bureau of Standards*

Among the specifications issued by the Government for many commodities the specification for dry cells and batteries occupies an unusual position. Within a few months after this specification in its revised form was promulgated by the Federal Specifications Board it was approved as an American Standard by the American Engineering Standards Committee, now called the American Standards Association. Other specifications issued subsequently by several sections of the American Railway Association have been made to conform to its technical requirements. The specification is unique also in another respect, since it is one of the few specifications that has been the subject of comprehensive and continuous tests in the National Bureau of Standards' laboratory.

Samples of dry cells and batteries are received periodically at the Bureau of Standards from manufacturers who produce the bulk of the many millions of dry cells sold annually in this country. Few other commodities have been tested as systematically. The reasons for these repeated cycles of test are found in the nature of the tests rather than in the intrinsic importance of the dry cell itself.

The Bureau of Standards receives calls from various departments of the Government for information about dry cells as well as a host of other materials. Fundamentally, therefore, the object of the dry-cell tests must be to meet the needs of the Government. Purchasing agents call for information when they want it, without realizing, perhaps, that an adequate answer to their inquiry, so far as it concerns dry cells, must be based on past tests and experience rather than on tests that can be made quickly on samples from some particular lot. No satisfactory way has been found to make tests of dry cells in a day or a week or even in a month. Accelerated tests on such a chemical system mean very little. The test which represents best any particular condition of service is one that covers approximately the same period of time as the cells would be in actual use.

Standard tests have been developed with the industry and these cover certain types of service. Thus, the specifications include heavy-service tests and light-service tests, intermittent tests and continuous tests. From this it is evident that by the time samples from some particular lot could be tested completely the lot would have been used up and forgotten.

Bureau selected to make tests.

To meet a situation that was admitted to be unsatisfactory, a conference of representatives from the various departments met at the request of the Chief Coordinator, Bureau of the Budget, to devise a method of dealing with these batteries. A survey of the yearly needs indicated that the Government makes considerable purchases of batteries. It was then decided that the Bureau of Standards should undertake systematic tests on the product of those manufacturers indicating a willingness to cooperate. These tests are known as "qualification tests" and they include the intermittent and long-time tests which are necessary to demonstrate the quality of the product. On the basis of these tests it is possible to state whether any particular brand is meeting the requirements of the specification; but the committee went a step further and provided that the qualification tests should also include such initial readings and tests of short duration as might be applied to samples from any particular purchases. Such tests, quickly made, indicate the uniformity of the product and, therefore, the probability of the particular shipment complying with the whole specification. The latter tests are known as "acceptance tests."

The results of the qualification tests are available for the use of Government purchasing officers for confidential use. Each manufacturer is informed of the results of his own product. It is not considered expedient for the bureau to publish the competitive merits, but the general effect of these tests on the industry has been beneficial to the public, as will appear later.

Twenty or more manufacturers of dry cells have asked to be included in the qualification tests year after year. For many of them it is a source of pride and satisfaction to meet the Government tests. Others are avowedly after Government business, still others lacking suitable facilities of their own for making the standard tests are glad to avail themselves of such a testing service. The samples are taken at the factories by the bureau's representatives about twice each year.

Because of the ready cooperation of the industry, the Bureau of Standards was immediately confronted with the problem of handling a large volume of testing without permitting it to absorb a disproportionate share of the bureau's personnel and resources. This problem has been solved successfully by installing an automatic testing equipment constructed in large part of materials used in the telephone field. Intermittent tests are controlled by clock mechanism, and means are provided to speed up the taking of laboratory data. The routine testing of 4,000 to 5,000 dry cells and batteries per year is handled for the most part by a man of junior grade. Supervision is, of course, required for the proper maintenance of the equipment and preparation of reports.

The specification is contained in Circular No. 139, issued by the Bureau of Standards. The word "battery" implies a group acting as a unit, whether the group be of guns, or boilers, or ball players, or cells to furnish an electric current. The cell is the unit part of the battery, but a single cell used by itself is sometimes referred to as a battery.

The specification begins by defining the batteries to be included. It is stated that they shall be of the salammoniac type with depolarizer. This is the ordinary type of dry cell of which many millions are made and sold annually. It may surprise some to learn that dry cells are not dry as the name implies. It is essential that the mixture in the cell be moist. When

properly constructed, the solution which the cells contain is not spillable, and no leakage should occur during the life of the cell. The types of cells and batteries included in the specification are:

(*a*) No. 6 dry cells, general-purpose type, suitable for ignition and heavy service and also reasonably good for any light service.

(*b*) No. 6 dry cells, telephone type, made especially for light service over a long period of time. These cells are better than the general-purpose cells on light duty, but are inferior on heavy service.

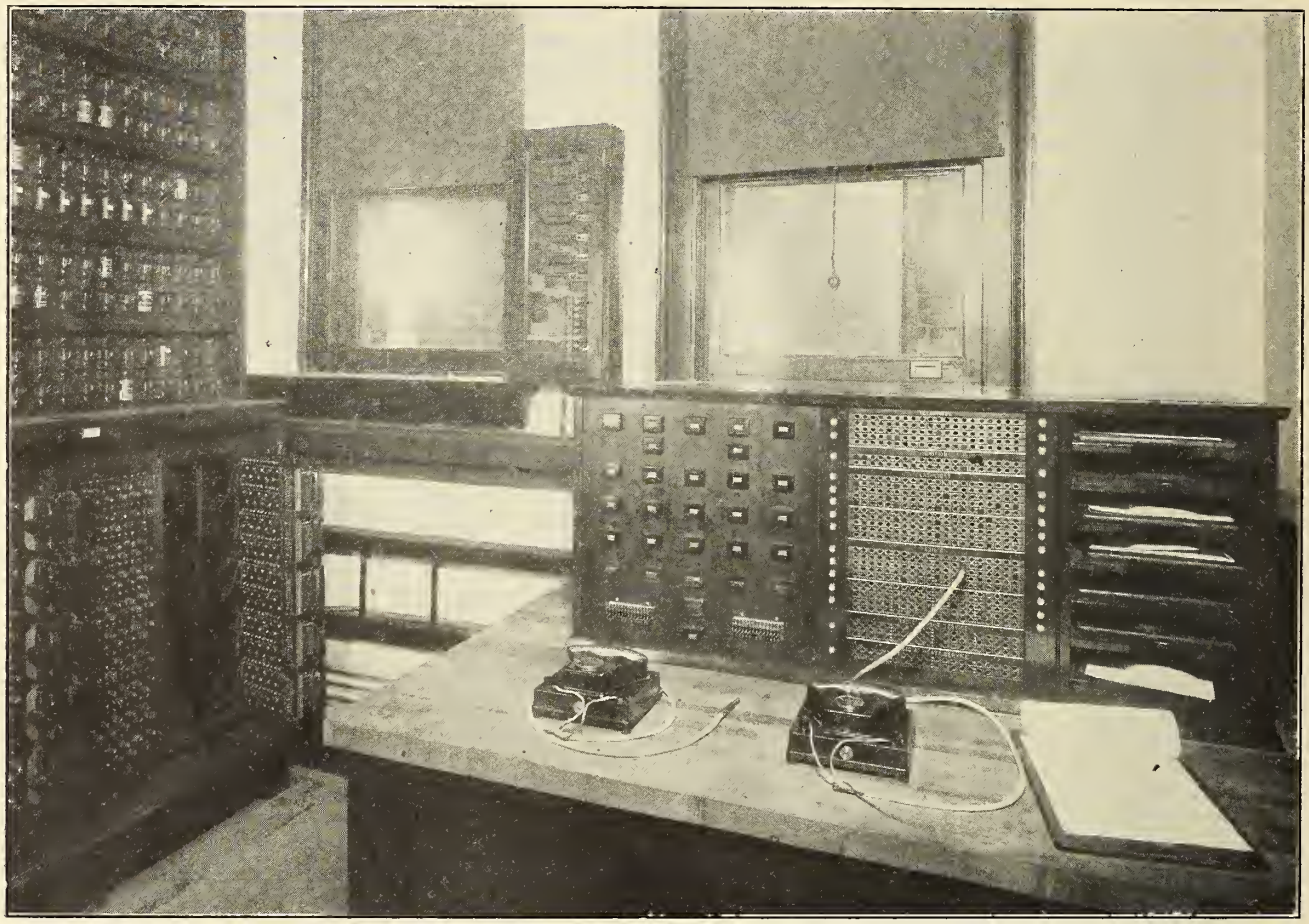
(*c*) No. 6 radio A cells. These cells designed for radio use, are often superior to the general-purpose cells in heavy service. Because of this, there is a tendency at the present time to make the general-purpose cells more like these radio cells. Their use for radio is decreasing with the change in character of radio sets, but the excellent quality of the best of these cells is likely to benefit permanently the cells designed for general purposes.

(*d*) Assembled batteries of No. 6 cells, these range from 6 to 9 volts and are useful for ignition of gas engines, blasting, burglar alarms, and many other uses.

(*e*) Flash-light cells and batteries. As the name implies these are used chiefly for flash lights. These cells are intended for intermittent use and should have a good "shelf life." Very recently an industrial type of flash-light cell having the standard dimensions of the others has appeared. This is intended for heavy and immediate service, such as reading of meters, wiring of switchboards, etc.

(*f*) Radio B batteries and C batteries. These batteries designed especially for use with vacuum tubes are useful also for other purposes. They are convenient units for high-voltage batteries.

Dry cells of the various kinds are much alike in their external appearance and are often used indiscriminately without reference to the kind of service for which they are particularly adapted. The specification, therefore, covers fully the conditions which the cells must meet and sets limits for the required performance of the sizes which have been adopted as standard, but in so far as possible the specification refrains from giving details which are properly within the province of the manufacturer and which, if included in the specification, might hamper the development of the art.



Apparatus for testing dry cells

A few of the cells, switches, and coils are shown at the left. Voltages are read at the telephone jacks at the right

Standard sizes of cells.

Certain sizes of cells, seven in all, have become standard. These are the survivors of a much larger number that were made prior to 1921. This limitation of the sizes was accomplished by a conference of the manufacturers who met at the Bureau of Standards to help revise the Government specification first published in 1918 under pressure of war activities.

A simple nomenclature for the standard sizes of cells and the batteries containing them is described in the specification so that the purchaser may know the num-

ber and size of cell which the battery contains. Thus a radio B battery marked " V 30D " is a battery of the vertical type having cells arranged in several layers one above the other; the total number of cells is 30 and the size of cell is given by the letter " D." This cell is 1¼ inches diameter by 2¼ inches high.

Maximum dimensions are given for the various sizes and types of batteries which are recognized as standard. These are given in inches and also in millimeters. Standard arrangements of the terminals are described.

The tests given in the specification are fully described so that anyone may follow them, but when any great number of tests are to be made the use of automatic equipment is necessary for practical reasons. The size and kind of dry cell or battery and the service required of it determine the kind of test to be applied. In general, the intermittent tests are preferred to continuous tests and should be made whenever possible since there is no direct relation between the results of continuous tests and intermittent tests of longer duration. The intermittent tests include the important factors of recuperation and the deterioration that occurs when the battery is standing idle. The duration of the intermittent tests varies from 25 days for the heavy service test to 190 days for the light service or telephone test. Delayed-service tests are also made after 3, 6, or 9 months on the shelf.

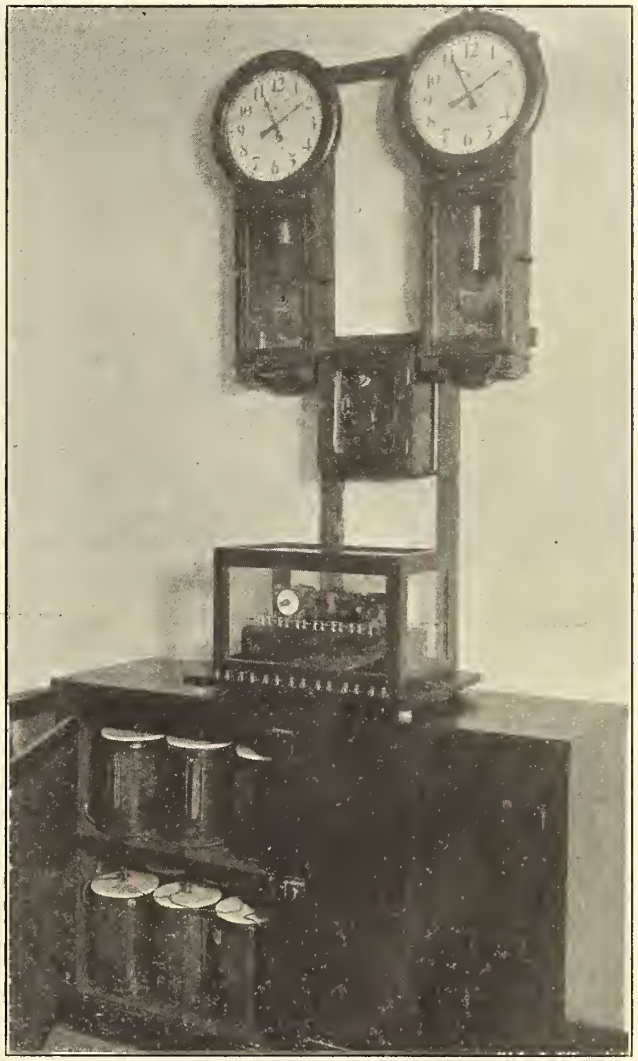
Requirements.

The minimum required performance is specified for each type of battery and size of cell. These figures have been adopted after most careful consideration of a vast amount of test data and by consultation with the industry. Dry cells have improved in recent years and this fact has been reflected in the specifications. The specification originally formulated in 1918 has been revised in 1923, 1927, and is again being revised for 1930. Specifications should always keep pace with the industry.

It would be possible to present data showing the improved performance of the various sizes and kinds of batteries to-day as compared with 10 years ago. The output of some types of batteries is now more than double that formerly obtained. The larger manufacturers have devoted much time to research and this has undoubtedly improved their product. The specifications may, perhaps, claim a part in the general improvement of dry cells and batteries. Reasonable specifications serve both as a goal for the producer and as a safeguard for the purchaser. The ambitious manufacturer wants to exceed the specifications by a liberal margin and he may at times receive a bonus for so doing. The cooperation of manufacturers at the present time is the best evidence that any misgivings which they may have had 10 years ago are no longer entertained. The specification is accepted as a fact.

The relation of the specified performance of batteries to the results of actual tests may be illustrated in several figures. Cuts show the results of tests of 6-inch dry cells of the same make in 1921 and 1929. Between 1920 and 1927 the specifications called for an output of 185 hours to a cut-off voltage of 0.75 volts. In 1927, this cut-off voltage was raised to 0.90 volts and the length of the required discharge reduced because the test had been made more severe. The curves in this figure show that the particular brand on which they are based is now giving a longer life to the higher voltage limit than it gave in 1921 to the lower limit. It is shown also that the radio cell of this brand in 1929 is giving more than double the output that the 1921 cell could give to 0.9 volt. The improvement in the cell is obvious.

One more illustration of a different kind will serve to show the relation of the specifications to the industry as a whole. In another illustration is shown the yearly results from 1920 to 1929 for the heavy intermittent test. The average of all the brands tested is shown in its relation to the output required by the



Automatic equipment for controlling tests of dry cells

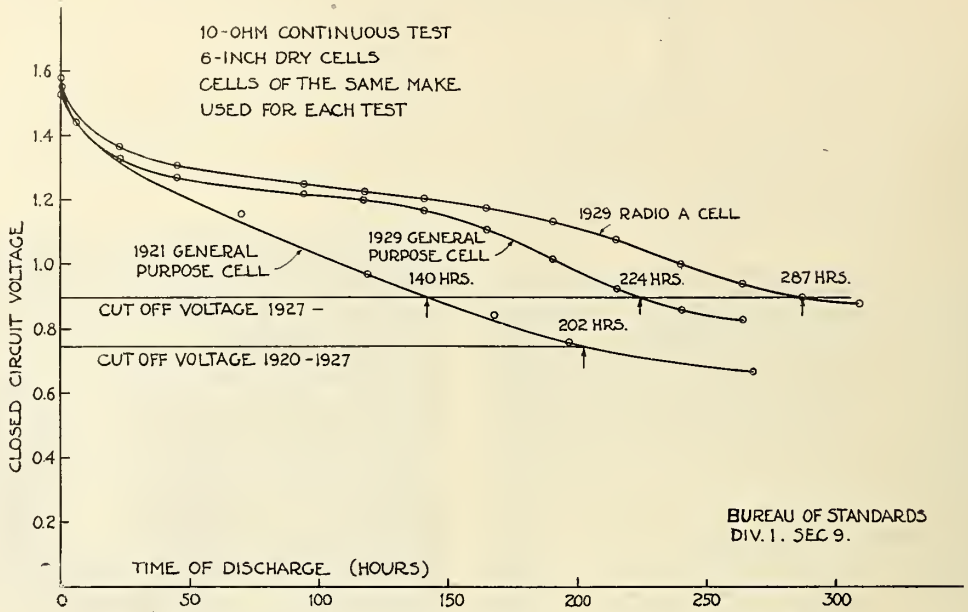
If one clock should stop the tests will be continued by the other.

specification. The latter is a series of steps upward. The dotted portion shows the new requirement proposed for adoption now. The highest and lowest results are also shown for each year, but the highest or lowest brand in any one year is not necessarily the same brand as in other years. The proposed requirement for 1930 is nearly double the requirement in force from 1920 to 1924.

Standard of quality.

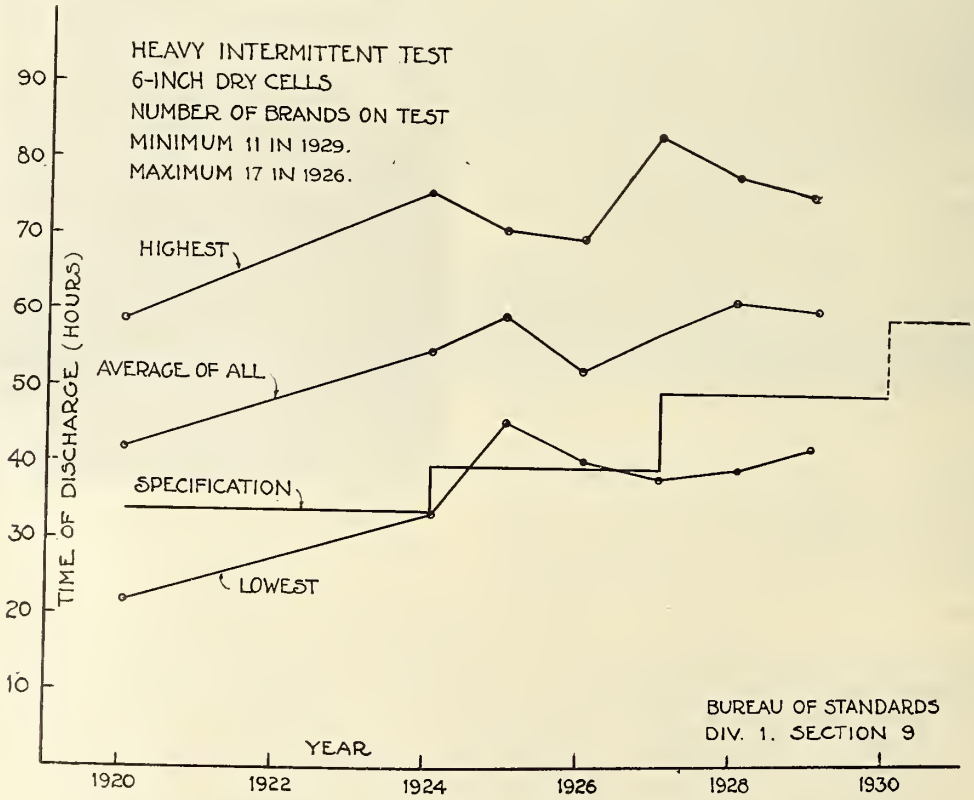
The dry-cell specifications have been formulated with the idea of establishing a single standard of quality, which should be representative of the best in American production and at the same time provide an

ample competitive field. It is true, obviously, that some makes and types of cells and batteries will exceed the minimum limits specified for the tests. Such superiority is a mark of perfection in manufacture and provides a safeguard against accidental fluctuations carrying the tests below the required limits. At times it may be desirable to call for such a superquality of product even at an increased cost. There has been no past experience to serve as a guide in doing this, but if certain principles are followed it seems possible. Equally well a lower grade of cell might be accepted, subject to conditions of mutual agreement between buyer and seller.



Comparative output of the same brand of cell in 1921 and 1929

Since several tests are specified for the various sizes and types of cells and batteries and no two brands are likely to exceed or fall below the required limits by the same amount on one test as on another, it becomes necessary to limit attention to the particular test which represents best the service for which the cells are to be used. For example, telephone and other



Relation of the specifications to the output of No. 6 cells tested, 1920–1929

light intermittent uses for dry cells are covered by the light intermittent test; ignition and heavy service are represented by the heavy intermittent test; flash-light cells of the ordinary grade, by the flash-light intermittent test; and flash-light cells of the industrial type by the flash-light continuous test. Having selected a single test, representative of the service, it then becomes possible to demand an output exceeding the required limits of the specification by a certain percentage or to allow a lower figure based on the established performance of any particular make or brand of battery, providing that the requirements as to construction, dimensions, and voltage have been met.

The amount by which this percentage could exceed or fall below the limits set by the specifications must be based on practical experience. It would seem that each time the specification is revised upward the percentage by which the best batteries exceed the required limit would diminish, but the experience of the past 10 years has shown a progressive improvement in the better cells which has been reflected in the specifications. Since 1924 the average relation of the output of the highest and lowest brands to the specification limit in effect at the time of test taken as 100 per cent has been approximately as follows:

Cell or battery	Test	Percentage of specified requirement	
		Highest	Lowest
No. 6 dry cell	Heavy intermittent test	168	90
Do	Light intermittent test	146	64
Radio B battery	5,000-ohm continuous	145	66
Flash light	Flash-light intermittent	152	71

There is little doubt that the highest figures represent the best of American manufacture. Any demand for a percentage output in excess of that required by the specifications, therefore, will result in a diminished field of competition. For this reason as well as unavoidable fluctuations it would not be wise to call for more than 25 per cent over the specification limit.

It is not equally true that the lowest figures represent the lowest quality of cell, because these tests have not included, except in few instances, cells of the lower grades and those containing less than the normal or the customary amount of active materials. Twenty-five per cent below the specification limit appears reasonable for cells of a lower grade which at the same time are not too low to give fair service.

The above discussion includes the important factor of shelf deterioration only in the case of the intermittent tests. The procedure of specifying a quality above or below the specification limit in the case of dry cells has not been tried out in practice, and the possibility of doing so must therefore be regarded as something of an experiment.

The nature of the dry cell and the variety of its uses have presented an unusual problem in the field of specifications and tests. Fortunately it has been possible to solve this problem in such a way as to benefit both the Government and indirectly the public, while at the same time winning the cooperation of the industry. Perhaps the experience which has been gained in this field may be useful in others.

BUILDERS' HARDWARE

Standard Accepted by Industry to Be Effective as of June 1

Announcement by the National Bureau of Standards was made on May 21, 1930, that written acceptances had been received from a satisfactory majority of producers and users for the Recommended Commercial Standard for Builders' Hardware (Nontemplate), and therefore the standard may be considered effective for new production as of June 1, 1930.

The standard comprises all the recommendations and types as listed in Simplified Practice Recommendation No. 18 (first revision), with numerous additions and changes approved by the standing committee. Agreeable to the desire of the industry, the standard will be printed in due course under the title, "Builders' Hardware (Nontemplate)—Commercial Standard CS22–30."

The central object is to establish standard nomenclature, definitions, and descriptions for regular items of builders' hardware, as well as standard finishes and finish symbols which will be recognized and followed throughout the industry. Among the new finishes listed as standard are the following:

USP, primed for painting.
US2C, cadmium plated.
US26, chromium plated.
US26D, dull chromium plated.

Exit bolts, locks, and latches are included among the new groups of standard items and are used mainly on exit doors to theaters and other public buildings.

INDUSTRY DEVELOPED 15 SIMPLIFIED PROGRAMS DURING FISCAL YEAR

Total of 113 Recommendations Adopted to Date

Fifteen additional simplified practice recommendations were developed by industry, during the fiscal year ending June 30, 1930, bringing the total number of general conferences to date to 127. Three of these recommendations were approved at general conferences of the industry concerned during the second quarter of 1930.

The various industries have to date approved and adopted recommendations covering 113 commodities, while others are in the process of acceptance. Three simplified practice recommendations, namely, paper shipping tags, wheelbarrows, and soft fiber (jute) twine, were issued as printed pamphlets during the second quarter, and are available through the Superintendent of Documents, Government Printing Office, Washington, D. C., at a nominal price. A total of 100 printed recommendations have been issued up to the present time.

Thirty-nine existing recommendations were reviewed by their respective standing committees during the past 12 months. Thirty-four of these were reaffirmed, without change, for another year, and five were revised. Surveys of production conducted on 25 recommendations during the past fiscal year showed an average degree of adherence of 86.7 per cent. During the preceding year, the percentage for 26 commodities surveyed averaged 85.4 per cent.

GOVERNMENT PURCHASING

Review of Advantages of Purchasing Through Guidance of Federal Specifications

By Rear Admiral H. H. Rousseau, *United States Navy, Chief Coordinator*

The use of the specifications developed by the Federal Specifications Board has greatly simplified purchasing by the numerous procuring agencies of the Federal Government, as all purchases, for a given article, are required to be made in accordance with the same specification. It has eliminated the make-shift method of describing articles wanted, by citing the trade name or brand of some fairly well-known product, in the shop-worn phrase "so and so or equal." This practice was objectionable in that whenever an attempt was made to purchase an article other than that of the brand cited, the purchasing officer was immediately put on the defensive as to its being the "equal," especially since it very probably had been offered at a lower competitive price. This meant tests on samples before award, as well as after delivery.

Another make-shift method has also been reduced to a minimum. It is that cumbersome plan of buying "as per standard sample." Such a practice probably limits competition and at best quite often affords but a poor basis of comparison with the goods delivered. Standard samples are frequently, more or less, inaccessible not only to the trade, but also to the user, and there is the likelihood that they will deteriorate. However, there are cases where it is admittedly necessary to have standard samples, for example, with color, finish, texture, or some characteristic that is difficult to describe in words.

Use of specifications.

The use of specifications reduces the incidental work of inspection and testing, and decreases the occasions for correspondence after delivery. The specification in effect serves three purposes. It describes exactly what is wanted; it guides the seller in preparing the delivery; and it provides both the seller and the buyer with a common yardstick by which to measure the quality and characteristics of the proffered delivery. Furthermore, it facilitates mass purchasing, as fewer and larger purchases are possible by the limitation of sizes, types, and grades.

The policy of harmonizing the user's specifications with commercial production does away with personal preferences and trade varieties, and the premium usually paid for special production. Savings are now reflected in the wholesale purchase of readily available articles from mass production.

The action of the Government in limiting types, grades, sizes, etc., induces a broader production of existing varieties. This increased production without increased varieties affords the manufacturer more experience of production in each variety.

Larger stocks permitted.

This force of limitation tends toward larger stocks of standard articles in the hands of merchants, wider distribution of these stocks, and, consequently, quicker deliveries and service. From this it follows that, by keeping its standards within the range of ordinary commercial production, the Government finds it possible to carry less total stock, even though it may be advantageous to buy each type or size in larger quantities. The use of any one variety is therefore broadened to serve more purposes, and greater interchangeability of supplies and interworking parts is the resultant advantage.

It is believed that the method of purchase on specifications, followed by the Government would be of equal economic value to commercial concerns.

STANDARDIZATION OF STEEL SHAPES

Belgium Association Announces the Publication of a Preliminary Report on the Standardization of Profiles

The Association Belge de Standardization has published "The Standardization of Profiles." The studies, which have been continued with some interruptions since 1919 induced the technical commission in its meeting of December 29, 1928, to adopt four series of shapes of beams, of U sections of equal and of unequal angles.

The calculation of characteristics was undertaken immediately, but this work, which requires great care, demands a considerable time, and it has appeared desirable to publish at the present time preliminary tables which contain only the principal dimensions and weights of the shapes definitely adopted by the commission, but which already permit consumers to concentrate their demands on the shapes recommended, and permit rolling mills to follow the new tendency in regulating their production programs. The final report will include, in addition to the completed tables, further tables covering T sections on which a subcommission is now elaborating a project.

QUALITY STANDARDS FOR MOP STICKS

At a general conference of the industry held at the Statler Hotel, Cleveland, Ohio, on July 17, a commercial standard for mop sticks was submitted to the entire industry for general approval and acceptance.

The commercial standard is a minimum specification for mop sticks used in domestic, janitor, and like service and covers the three types in most general usage known as the domestic size, spring-lever type; janitor size, spring-lever type; and janitor's screw type. The specification provides for the size and character of the wood handles and the thickness, finish, and other requirements of the metal parts.

Copies of the standard as recommended by the conference may be had upon application to the division of trade standards, National Bureau of Standards, Washington, D. C.

STANDARDIZING GARAGE DOORS

Pacific Coast Door Manufacturers Association Standardize Garage Door Designs, Grades, and Sizes

By Harry L. Potter, *Associate Editor, The Timberman*

With the development of the automobile, there naturally came a demand for garage doors so that there gradually grew up a substantial production of garage doors by Pacific coast door manufacturers. It seemed, however, that every customer desired some small change in design and each manufacturer likewise had a set of designs. The result was a multiplicity of designs and sizes, to say nothing of grades, which actually made the so-called stock door a detail door, expensive to manufacture and unsatisfactory to sell. To still further complicate the situation there was no standard set of grading rules.

After talking this situation over with the principal Oregon and Washington garage door manufacturers, the writer called a meeting of the producers, laid the situation before them, and suggested that an organization be perfected to standardize garage door designs and grades. This resulted in the formation of the Pacific Coast Door Manufacturers Association in the summer of 1924.

Regular meetings were then held, at monthly intervals, at which designs were selected, standard specifications for construction adopted, and standard grading rules devised. Drawings of the designs adopted were then made and approved. Following this, the data were made up into the Pacific Coast Standard Garage Door Catalogue. This was placed in the hands of a printer so as to permit any one interested to secure the catalogue.

Each design in the catalogue was given a special number, which in itself indicates the type of door. For example, No. 63–V garage door means a 6-light 3-vertical-panel door. The first numeral in each case indicates the number of lights, the second numeral indicates the number of panels and the capital letter "V" or "X" stands for vertical panel or cross panel, respectively.

The catalogue, as finally adopted, embraced seven standard designs. In all, it took about eight months to do the standardization work. Upon completion of the standardization work the association was dissolved, inasmuch as its purpose had been accomplished; namely, the standardization of designs, sizes, and grades of garage doors. The seven standard designs took the place of perhaps 60 nonstandard designs.

FOURDRINIER WIRE CLOTH

Paper-Making Industry to Consider Adopting Standard

A request has been received from the Wire Cloth Manufacturers' Association for the cooperation of the division of trade standards in the establishment of a commercial standard for Fourdrinier wire cloth for paper-making machines.

Fourdrinier wire cloth is an endless belt used on the wet end of a paper-making machine, through which much of the water is separated from the pulp and on which the sheet of paper is formed.

The proposed standard is intended to serve as a basis of common understanding as to criteria between the producers and users of this type of wire cloth. By this method it is hoped that misunderstandings between buyer and seller may be avoided, and the waste and expense incident thereto may be eliminated. According to present plans, the standard will cover nomenclature and definitions, grading rules, kinds of wire to be used, sizes of wires and openings, physical requirements for wire, and recommended standard practices in the handling, installation, and use of this commodity.

STANDARD PROPOSED FOR MIRRORS

Industry Approves Recommended Standard

A general conference on the standardization of mirrors was held at the Gibson Hotel, Cincinnati, Ohio, on June 12. This conference was in the nature of a general hearing to consider the adoption of a proposed specification covering the grading of mirrors. The proposed standard was formulated by the standardization committee of the Mirror Manufacturers Association; but in order to have it generally acceptable, all interests of the industry were invited to participate in this conference including the mirror manufacturers, the manufacturers of mirror plate, the distributors of mirrors, furniture manufacturers, and others.

The standard of quality was proposed as a basis of common understanding within the industry and by its general adoption and use it is expected that interest may be revived in the use of better quality mirrors. It is also anticipated that packing charges, shipping costs, and other expenses incident to exchanged merchandise which results through misunderstandings between buyer and seller will be eliminated.

After certain adjustments had been made, the conference approved the proposed standard for recommendation to the industry for formal acceptance as the standard of quality for everyday trade. The standard establishes five grades of mirrors and limits the kind and extent of specific defects which may occur in each grade. Suggestions are given as to the manner in which the mirror should be examined, and a glossary of terms explains the various trade designations used to denote the defects which occur more or less frequently in the plate glass from which mirrors are made.

In addition to the foregoing there is included a guarantee label in a series of color which may be used on mirrors that meet the commercial standard specifications to denote the various quality classifications established. The recommended commercial standard is now being sent to those interested, and copies may be had upon application to the division of trade standards, National Bureau of Standards, Washington, D. C.

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STANDARDIZATION IN HIGHWAY EQUIPMENT

Antiquated Equipment Giving Way to Modern Standardized Working Tools

By Lye A. Brookover, *American Road Builders Association*

In considering the standardization of equipment and methods we view it from two angles, namely, the manufacturer and the consumer.

Early manufacture was, perhaps, better standardized than modern production. That was due, undoubtedly, to the newness of road machinery equipment to both manufacturer and consumer. There were but one or two factories to start with, and these manufactured a very restricted number of items. Definite demands and needs were obscure, but great progress was made with the limited equipment available. The manufacturer was in control of the situation because his product was absolutely standardized; in other words, the consumer was obliged to take what the manufacturer offered as standard equipment.

A very great change has taken place during recent years with the appearance of numerous new names on the manufacturers' roster. Each factory was founded with certain ideas, novel in many cases, of what the consumer needed in the way of most effective equipment. This influx of manufacturers has resulted in a myriad of different equipment of various models and designs, with seemingly no definite standardization. The consumer, at the present time, is largely in control, because if he demands his own ideas in equipment, such as longer or shorter blade lengths, curvatures, bearings, wheels, or blade lifts, the manufacturer supplies it in order to obtain the business and survive the fierce competition which exists.

Nowadays seemingly any new idea has a very good chance of becoming accepted in production if sponsored by a sufficient number of consumers to economically justify the change. The country being so large, conditions so divergent, and the great army of men in the road-building industry offering such a host of ideas, presents a condition anything but standardized when those ideas are interpreted in manufacture.

Manufacturers interested.

Manufacturers are necessarily fully conversant with the present situation, and they are doing everything possible to correct it in so far as they can. A few items of production standardization which show the tendency and the urge toward complete standardization should prove of interest. These include the same radius for various grader blades of other and dissimilar specifications and the same spacing for punchings in various blade bits. Lifting mechanisms on various sized graders are not only becoming similar but identical on various machines where this practice can be found consistent with reliable and durable production. Wheels are similar in every respect except size. The shape of the frame is the same for the complete line of manufacture. There is rapid advancement toward complete standardization of antifriction bearings, and these are now similar except for size. Scarifier attachments for maintenance and construction equipment are of the same style and differ only in strength. Manufacturers who offer both straight and leaning wheel graders now have production so standardized that one frame will accommodate either straight or leaning wheel devices. This also holds true for graders having either one or two piece telescopic rear axles and for either spoke or disk wheels.

In other words, a point is rapidly approaching wherein all grading and maintenance machines are very similar except in size and strength. This procedure is the only logical course when the one fundamental purpose—economy—is kept in mind. The essential features of any successful road equipment are durability, capacity, and simplicity. Their relative importance is in the order named, and when these three essentials are satisfied all other demands and requirements of machine specifications are superfluous and only increase the cost of production and the ultimate price the consumer must pay.

Effecting economies.

Appreciable economies are effected by the above standardization. More parts or units may be built at a time, at a great reduction in cost. Assembly costs are minimized due to standard set-up of equipment. The quantity of parts needed as warehouse stock is decreased, although carrying a sufficient number to care for all field requirements. The standardization and the minimization offer an easier and more positive method of keeping machines in the field in satisfactory working condition.

We have said that the consumer is at fault in demanding innovations from standardization where they are not essential to the purpose at hand. These special nonstandardized requirements merely satisfy the personal ideas and ego of the consumer. They are nonessentials. They impede factory production and always increase the cost of production and the retail price. On the other hand, the manufacturer is greatly at fault in complying with these scattered whims. We only attempt to justify compliance through the desire for increased business and the retention of old business in the face of admittedly severe competition to be found to-day.

Certain State and county organizations are assisting with the general problem of standardization. Certain States and groups of counties require standardized punchings and specifications, but until all States and all buying organizations get together the requirements of a few isolated organizations merely confuse the problem and require additional production rather than a minimized and standard production. Too, it must be remembered that there are thousands of machines of past production in field operation, and these must be maintained by continued production to their specifications.

Difficult to accelerate standardization.

It is difficult to accelerate standardization because different manufacturers have engineers with ideas derived from schools teaching various and different theories in design and construction. It is hard to effect a compromise between the varying ideas of these

efficient men. The standardization policy of one manufacturer may be one of economy to the consumer—first cost; while that of another may be one of service to the consumer. Whereas one factory may produce equipment to be sold on a basis of low first cost, another produces it to be sold on a basis of satisfactory service over a long period of years. These two policies are as divergent as are the possibilities of mutual standardization.

There should be increased standardization in design of machines, in lengths of blade, in weight, in frame shape, in manufacturing policy, resulting in uniform competition, minimized production costs, and minimized retail costs. The same may be said of machine strengths, fewer sizes of machines at standardized strengths and required horsepower, sufficient for maintenance and construction purposes. It would prove decidedly cheaper to the grader manufacturer as well as to the tractor manufacturer and the consumer.

The important factors that have occasioned great improvement in the design of both construction and maintenance equipment are: (1) Automotive influence, (2) competition among makers and among users, and (3) vast construction programs. In the consideration of maintenance equipment, different sections of the country use different set-ups or combinations. In past years horse-drawn equipment was all that could be had, and took care of the problems of that day in an acceptable—if not strictly satisfactory—manner. We find horses used as motive power to-day only in sections where they and their food requirements are abundant. Horses have given way over the country at large to gasoline motive power. Horse-drawn patrol graders have been succeeded by tractors, pulled or pushed motor graders, or maintenance blades mounted under truck bodies.

Because of the ever-increasing traffic on public highways, it has been found that motorized maintenance equipment is the truly economical kind to be used, because it improves the general quality of work, the quantity of work in a given time, and reduces maintenance costs considerably below those of other equipment which has proved inadequate.

Present-day standardization.

Present-day standardization of maintenance equipment may be found a part of State highway department policies, which specify the use of the heaviest and most powerful motor graders on those public highways of greatest traffic use. Lesser sized and powered machines are used on highways of less traffic. The tendency is toward establishment of different motor grader sizes consistent with the amount of traffic, which ultimately will cut maintenance costs and at the same time provide entirely satisfactory work. It is as uneconomical to overwork a machine and expect more of it than it was designed for, as it is to place a large expensive machine on a job entirely insufficient to the machine's capacity.

Construction equipment is responding to the cumulative effective of many refinements, rather than to unusual and superfluous innovations in design, resulting in machines of greater efficiency and reliability. Manufacturing standardization points toward ease of maintenance of construction equipment. Moving parts are being inclosed, gears and drive chains placed in dirt-proof, oil-tight housings, and more attention is being given to the comfort of the operator. Continued refinements in design with rigid retention of the three important factors, durability, capacity, and simplicity, are bound to offer increased life, lowered maintenance expense, and increased output of the equipment consistent with its strength and power of motive traction.

A short time ago construction machinery was built mainly of grey iron, structural shapes, standard steel plates, and forgings from ordinary steel. Specifications to-day call for alloy steels, heat-treated steels, special forgings, cast steel, and other high-grade materials; yet, even with these higher priced materials, standardization of parts and of machines has made it possible to offer this better equipment to the consumer without increased cost.

Construction equipment remains about the same in general character, differing radically only in sizes, strengths, and durability. The common scraper is still employed; so is the wheeled scraper, although these two, for more economical haulage, have given way to the rotary scraper and tumblebug scraper, tractor pulled. Where horses gave way to tractors in maintenance equipment, the same is true of construction equipment of larger capacities.

Replacement of old equipment.

The old-style horse-drawn wagons of 1½ cubic yards capacity are still in use, but they have been generally replaced by the modern all-steel crawler-drawn dump wagons of capacities ranging from 5 to 12 cubic yards. Elevating graders of wood construction have been replaced by steel construction, and crude, cumbersome operating devices have made way for modernized appliances which not only offer increased strength, but great flexibility, increased efficiency, and assurance of continued operation, all spelling increased production at greatly minimized cost and offering, at the same time, a fair and lucrative margin of profit to those charged with the burden of financial overhead.

Small tools, blade-construction graders, elevating graders, crawler wagons, have reached their highly perfected state by process of development through the experiences of thousands of machines in the field, under all kinds of conditions in the hands of the most critical contractors and public officials. No perfect machine or machines are produced in any other way. Construction equipment of to-day is conceded to be small tools and blade graders for projects of load capacity or yardage and elevating graders and crawler dump wagons for projects of larger capacity and yardage and for projects demanding the borrowing of large amounts of earth. For this latter usage, nothing quite approaches the elevating grader and crawler dump wagon in economy.

The public at large is interested in improved road service and count on the road builders to furnish that service at the lowest possible cost consistent with the prevalent costs of labor and equipment. The manufacturer is interested in supplying satisfactory and modernized practical equipment at a figure consistent with cost of materials, labor, and a justifiable margin of profit. These three groups can more conveniently and more satisfactorily realize their objectives by a closer cooperation, a sincere and mutual sympathy, each for the problems of the other, and a strict determination to reach those objectives through the logical and most apparent means—standardization.

ADVERTISING STANDARDIZED PRODUCTS

By A. S. McAllister, *National Bureau of Standards*

No argument is needed to convince either wholesale or retail dealers of the desirability of knowing the exact quality of commodities purchased by them for sale to others. If each dealer were thoroughly expert in inspecting every type of commodity handled by him and could devote to the work of inspection adequate time for handling all of the commodities represented by his transactions, he might be able to conduct his business without depending upon written specifications. Even in this case he would be guided by his own specifications, unwritten, it is true, but specifications none the less.

When a dealer's business so expands that he is no longer able to act as his sole combined purchasing, inspecting, and sales agent, he must convey to his assistants his ideas as to the desirable quality of the commodities handled by him. He then recognizes the need of proper written specifications and makes them a matter of record. With further expansion of his business he realizes that, taken as a whole, his needs can well be served by utilizing the accumulated experiences of his own organization, those of his competitors, his purchasers, and his suppliers in formulating specifications for such of the staple commodities as are represented in his transactions. Finally, he comes to the conclusion that industry in general and his own interests can best be served by making use with staple commodities—not specialties—of such specifications as have been formulated by responsible, qualified nationally-recognized organizations and widely adopted by the trade.

Among the staple commodities for which specifications might well be used are those that can properly be handled on a mass-production, mass-distribution, mass-consumption basis. Through competition the well-known economies realized by manufacturers from concentrating production on one standard line of goods rather than on many lines are passed along to the wholesalers, the retailers, and the general public.

Manufacturers, wholesalers, and retailers can not fail to recognize the potential advertising value of a statement in their sales literature to the effect that certain staple materials sold by them are guaranteed to conform to certain well-known specifications, standards, or grading rules. The more progressive of the manufacturers and dealers realize that an effective method of taking advantage of the publicity given in the formulation and promulgation of nationally recognized specifications and standards is to advertise that their products comply with these standards and specifications.

PHARMACEUTICAL STANDARDS ESTABLISHED

Standardization Activities of American Pharmaceutical Association Reviewed; Pharmacopœia Established in 1820

E. F. Kelly, *Secretary American Pharmaceutical Association*

The American Pharmaceutical Association was established in 1852 as the result of a meeting of representatives of all branches of pharmacy called in 1851 to prevent the importation into the United States of substandard and adulterated drugs and medicines. Thus the first national organization of pharmacists was brought into existence. Its first efforts were to prevent a serious menace to the health and welfare of the public through the distribution and use of drugs and medicines which were not of the proper quality. Organized pharmacy's full support was given the Government in its successful efforts to correct this condition, and the development of the highest standards of identity, quality, and strength for medicinal substances has continued to be a principal association activity.

These efforts materially contributed to the enactment of national and State pure food and drugs acts and to the establishment of agencies, under these acts, which regulate the quality and labeling of substances used in the mitigation, cure, and prevention of disease, a standardization achievement of primary importance in the preservation and improvement of the public health. The association secured the adoption of the United States Pharmacopœia and the National Formulary in the national pure food and drugs act, as providing the necessary standards for the identity, purity, and strength of drugs, which adoption was followed in each State act. These laws could not have produced the prompt and satisfactory results which followed their enactment if the necessary standards for drugs had not been available through more than a half century of continued effort.

Pharmacopœia established in 1820.

Although the Pharmacopœia was established in 1820, 30 years before the American Pharmaceutical Association, it had not been generally accepted by either medicine or pharmacy. One of the first committees created by the association was that on "the improvement of the Pharmacopœia," and the association has since given a support which has contributed to the development of this book of standards to its present high position after 10 decennial revisions. In 1886 the association issued the National Formulary to provide standards for drugs and medicines not included in the Pharmacopœia, which is necessarily limited in its scope. The fifth edition of this work was published in 1926, and a committee is preparing the sixth edition, which will be completed about 1936.

When the United States Pharmacopœia and the National Formulary were adopted as legal standards their scope was further limited. The association then undertook the compilation of the Pharmaceutical Recipe Book, the first edition of which was issued in 1929. This gives formulas and directions for preparing a large number of medicines of local use or used in hospitals and other institutions, and the formulas were selected after careful experimentation and with the purpose of bringing about greater uniformity.

The association has seven other committees working on standardization besides the committees on United States Pharmacopœia, on National Formulary, and on the Recipe Book, as previously mentioned. The committee on unofficial standards formulates standards, so far as it may be found to be desirable, for such drugs and chemical products for which standards are not otherwise provided. The committee on pharmaceutical syllabus cooperates with a similar committee from the American Association of Colleges of Pharmacy and the National Association Boards of Pharmacy in preparing a minimum course to be taught in the various colleges of pharmacy.

Committee on horticultural nomenclature.

The committee on horticultural nomenclature represents the association in cooperating with other scientific bodies in this important endeavor. The committee on physiological testing interests itself in the development of processes for the preparation and testing of those drugs which do not lend themselves to other methods of standardization. The committee on weights and measures has for its principal activity the extension of the use of the metric system in pharmacy and also gives consideration to the general subject of weights and measures so far as they affect pharmacy. The committee on international pharmaceutical nomenclature cooperates with foreign associations in bringing about uniformity as far as possible. In 1926 the association organized a committee to investigate the light-protecting properties of various colored glass containers and to determine the amount of protection afforded or deterioration produced by light from the ultra-violet and infra-red regions of the spectrum. It is expected that the investigations of this committee will result in the preparation of specifications for colored glass containers for the protection of medicaments.

Early in the present century, the association fostered the formation of the American Association of Colleges of Pharmacy and the National Association Boards of Pharmacy and has cooperated with these organizations in standardizing, as well as improving the course of education in pharmacy and the licensing of pharmacists, so that to-day a pharmacist registered in one State can become registered by reciprocity in practically every other State in the Union.

With the association's model law as a basis, each State now has a pharmacy act regulating the practice of pharmacy and limiting this privilege to those properly trained and licensed. The association was also largely instrumental in the enactment of State laws regulating the sale and use of narcotics and other poisonous and dangerous drugs, and in the enactment of the national antinarcotic law.

At the last annual meeting of the association a conference of pharmaceutical law enforcement officials was formed to bring about greater uniformity in the pharmaceutical legislation of the several States and in the enforcement of these laws which are for the protection of the public. These standardization achievements assure to the American people drugs and medicines of high quality and that they will be dispensed only by those properly educated and licensed for this important duty.

SIMPLIFIED SCHEDULE OF PACKAGING OF DENTAL PLASTER AND INVESTMENT APPROVED

Recommendation Will Become Effective November 1, 1930

A simplified practice recommendation covering the packaging of dental investment, artificial stones, and plaster was approved by a general conference held June 27, 1930, at Saranac Lake, N. Y. This meeting was held in conjunction with the annual convention of the American Dental Trade Association.

The program establishes package classification for these materials, and under each classification a specific weight or limits of weight, for the net contents of the package. The recommendation does not provide for the shape of the package or the material entering into its manufacture. Package sizes for 3 of the 4 classifications for plaster will be reduced from 22 to 3, while sizes for 4 of the 5 classifications for investment will be reduced from 26 to 13. In addition to the reduction in variety, the program will establish definite package sizes for separating plasters and artificial stones. The program was made effective from November 1, 1930, subject to acceptance by the trade in sufficient volume to insure its initial success.

The completion of this recommendation marks a step in the general simplification program for dental supplies of the American Dental Trade Association, of which George A. Lilly is managing director. Recommendations have already been completed for dental hyperdermic needles, and dental brush wheels. Others are in the course of devlopment.

STEEL FOUNDERS ADOPT STANDARD FORMS

The Steel Founders Society of America (Inc.), through the managing director, Granville P. Rogers, has recently adopted and issued a standard sales agreement, order acceptance, quotation sheet, and a set of standard trade customs for that industry.

The growth of the industry in recent years has made it desirable to clarify and simplify the many questions arising between buyers and sellers and to gain a more equitable understanding of contractual relations. It is anticipated that the buyer will be benefitted by a standard practice which places all quotations and estimates on a known basis, and it also calls for uniform painting of patterns to indicate special treatment. The foundry's liability, inspection, shipping, and terms are clearly stated and are the result of cumulative experience in solving these questions for the best interests of both parties.—*American Machinist.*

SIMPLIFICATION AND STANDARDIZATION WITHIN THE ELECTRIC LAMP INDUSTRY

Standardization is Responsible in Large Measure for the Successful Development of the Industry

By Harold H. Green, *National Lamp Co.*

Simplified practice and standardization have turned electric lighting from a rich man's luxury to a blessing for all people. It has made it possible to sell a lamp to-day for 25 cents that gives more than twice as much light as one that cost $1.50 in 1908. It is believed that simplified practice and standardization, more than any other principle, has contributed to the remarkable development in artificial lighting, and to the success of the business of making and selling of Mazda lamps.

Let me emphasize that statement by giving you a few high lights on what has happened in the lamp business since 1914. The average price of all commodities is much higher than in 1914, but the average price of tungsten lamps is 44 per cent lower than in 1914. The annual sale of large lamps has increased from 110,000,000 in 1914 to approximately 304,500,000 in 1926. Because people can now buy better lamps at lower prices, they are buying larger lamps. The average wattage of tungsten lamps sold in 1914 was 47.4 watts per lamp. In 1926 it was 58.9 watts per lamp.

Work started in 1914.

Simplified practice and standardization in the incandescent lamp business began long before 1914. Something had to be done; for if you had checked up the number of lamps used for ordinary lighting purposes in the year 1900, you would have arrived at the startling figure of 55,000 types. One would imagine that with so many types of lamps to choose from, one might select something rather pleasing and distinctive in the way of incandescent lamps. Despite the 55,000 types of lamps, a buyer had a choice of only five sizes: 2, 4, 8, 16, and 32 candlepower. All were carbon-filament lamps; none were colored.

It was largely because there were 175 different lamp bases in common use and because lamps for general lighting purposes were made in 30 voltages that the number of types was so great. Up to this time lamps had been made largely by hand and by companies supplying small territories. The great number of types did not bother the lamp makers much because no one manufacturer really made them all.

But men began to see the possibilities of machine manufacture for producing lamps of greater and more uniform quality at lower prices. They began to see beyond the making of lamps in a shed and peddling them "hot" from a cart; they wanted national distribution and sales. That meant that lines had to be standardized. The first efforts toward this end began with an attack on lamp bases.

The Edison screw type of base, or the medium screw base as it is now called, was chosen as the most desirable by electric lighting companies and manufacturers. The lamp manufacturers contributed very largely to the speed with which base standardization was accomplished by offering lamps with the standard base, together with an adapter for fitting the lamp into other types of sockets, at the price charged for the lamp alone. It was but a few years before the medium screw base superseded all others. And to-day, 26 or more years later, those earlier bases are museum curiosities.

Voltage standardization.

In the meantime the entire lighting industry was making a drive to standardize lamp voltage. There is an interesting story connected with this. Edison's first practical lamps were designed to operate at 110 volts. Other lamps were manufactured for different voltages, generally lower, such as 40, 55, and 80 volts. Since the Edison organization had developed a complete system of electrical supply, as well as the lamp, the 110-volt system gained precedence over low-voltage systems.

In the early days of lamp manufacturing, however, it was impossible to predetermine the exact voltage of a lamp and, consequently, a considerable portion of the production ran off voltage. In order to utilize these off-voltage lamps, electric lighting companies began supplying electrical energy at various voltages on both sides of 110. Up to 1910 no effort was made to restrain the spread of voltages within the 100 to 130 volt range. However, by 1913 it had become possible to manufacture lamps accurately at any desired voltage. It was then that lamp makers, in checking over sales, reported that there was a gradual increasing concentration of demand on 110, 115, and 120 volt lamps.

By thus eliminating variations in voltages and bases, the number of lamp types had decreased to 342 in 1923, as compared to 55,000 in 1900. And whereas the biggest lamp in 1900 was of only 32 candlepower, the 342 types of 1923 included lamps of from 10 to 10,000 watts. This eliminating of types had made it possible to develop and adopt high-speed machinery for lamp making. These machines eliminated practically all costly hand operations and made better lamps in larger quantities and at lower prices.

Another very great advantage of lamp-type standardization was the reduction of stock. As an example, we found in 1923 that out of one warehouse stock of 2,675,000 lamps, we could ship 191,400 lamps of one type and voltage. In Europe, where standardization has apparently not advanced as far as in this country, out of a similar stock of approximately 3,000,000 lamps, the largest individual stock of one type was only 3,000.

Up to 1923, we had merely worked on the elimination of types, but in that year there began the planning of an entire new and simplified line of lamps to replace all existing types of 100 watts or under. Inasmuch as 74 per cent of large Mazda lamp sales are for general or home lighting service, in sizes up to 100 watts, attention was first directed to this class of lamps.

Research carried out.

In this classification were 45 types of lamps, differing in size, shape, and bulb finish. Quite appar-

ently this was an excessive number, yet investigation showed that if any 1 of the 45 were eliminated, its place would not be satisfactorily taken by any of the remaining lamps. And certainly a standardization step would not be justifiable that would impair lighting service to the public. There were but two things to do. Continue with existing lamp types or attempt to develop a new line of a few lamps which would offer at least all the advantages of the old ones. The second choice was made, and experimental work was begun at once.

By the fall of 1923 it was reported that all general lighting requirements could be adequately met with five lamps in sizes of 25, 40, 50, 60, and 100 watts, with a new bulb, pleasing in shape and stronger because of its shape, common to all the lamps and varying only in size to accommodate the various wattages. A newly developed type of coiled tungsten filament was recommended for all the lamps, because it was ten times as strong as existing types of straight filaments and more efficient as a light source. It was believed, however, that one standard bulb finish would be impossible; that is to say, it would be necessary to continue the manufacture of clear lamps, because of their greater light output and various types of frosted lamps would be required because of their light diffusing and glare reducing qualities.

A stroke of good luck and genius.

At this time a young chemical engineer named Marvin Pipkin was employed in the lamp development laboratory at Nela Park. Fired with the enthusiasm of a big idea, he one morning rushed into the office of the laboratory director and eagerly recommended the adoption of inside-frosted bulbs for the contemplated line of lamps. In full detail it was explained that for at least 20 years lamp makers had recognized inside frosting as the ideal lamp bulb finish because: Inside frosting diffuses the light adequately and transmits 99 per cent as much light as a clear bulb, whereas various types of outside-frosted bulbs absorb from 7 to 25 per cent of the light. The outer surface of an inside-frosted is smooth, and, therefore, will not collect and hold dirt that impairs appearance and cuts down light output on outside frosted lamp bulbs. However, it was pointed out to the young engineer that inside-frosting so weakened the bulbs as to make them entirely impractical for lamp making.

"Go to it and see if you can make a strong inside-frosted bulb, everybody in the lamp game tries it sooner or later," was what they jokingly told him.

Pipkin did what even the great Steinmetz had tried to do in vain, and he did it in two weeks time. He came back to the office with six pearl-gray bulbs, all inside-frosted. Three of them he placed on the end of a desk and gently pushed them over. They smashed to bits. The other three he dropped to the floor from shoulder height. They bounced and remained intact. He had made the inside-frosted lamp bulb practical. He did it by merely treating the inside of the bulb with a weaker solution of the same acid that etched it, thus restoring its strength.

The strengthened inside-frosted bulb was at once adopted as the standard for the new line of Mazda lamps. To those who have witnessed so much of the benefits of a standardized line in the development of the lamp business, standardization seems synonymous with success.

BRITISH STANDARD RAILWAY SIGNALING SYMBOLS

Part I of Publication Dealing With Schematic Symbols Announced

Part I of the British Standard Railway Signaling Symbols, which publication deals with schematic symbols, has just been issued by the British Engineering Standards Association. The symbols are intended for use on drawings showing signaling requirements, and none of them attempts to show the component parts of the apparatus to be used. They have been so designed that they may be combined with each other in cases in which one does not adequately represent the complete device.

For convenience of reference, the symbols have been divided into seven numbered sections, namely, signals (semaphore and light), points, track details, apparatus, controls, level crossings, and buildings. An alphabetical index is given at the end of the publication.

Part II, which it is hoped will be completed in a few months, will cover the wiring symbols; that is, the symbols for the actual apparatus used with their electrical connections, and also written circuits or simplified wiring diagrams. These two publications should prove of great interest and value to all railway staffs concerned not only with operation but more particularly with the practical engineering side of railway working, and should be the means of saving much time in the preparation of plans.

BRITISH STANDARD FOR PLUGS AND SOCKETS

Revision Announced on Standard for Reversible Type of Plugs and Sockets

A revision of British standard specification No. 196, which deals with reversible, protected-type, two-pin plugs and sockets, with earthing connections, for circuits up to 250 volts between any two poles, has recently been issued by the British Engineering Standards Association.

Although the differences between the new (1930) and the 1927 editions are small, they are of interest from the manufacturing point of view. One of the differences relates to the dimensions of the lug on the nonreversible plug and socket. It has been found that, with slight irregularities in manufacture, there was a risk, in some cases, of being able to force the lug (the nonreversible device) into a hole in the socket not intended for the reception of this lug. A slight modification has therefore been made to the dimensions in order to remove this possibility. A few other changes, mainly of an editorial nature, have been introduced.

COMMERCIAL STANDARDS—AN ANSWER TO SOME DISTRIBUTION PROBLEMS

Setting Up of Minimum Quality Requirements Helps to Retain "Good Will" in Business—Low Prices Often Met by Poor Quality

By Harry H. Steidle, *National Bureau of Standards*

If there is any question as to the average American's belief in signs, it will be quickly dissipated by turning to the millions of nomadically inclined tourists who have implicit faith in the markers at our cross roads. Slowing down to "30" they get a fleeting glimpse of the sign to Portland, Denver, or New York, and on they go confident that they are on the right road to their destination.

What, however, would be the attitude of the tourist who found himself 40 or 50 miles on the road to Detroit when he wanted to go to Denver? The answer is very obvious—his confidence in road markers would be shaken and with several repetitions of the experience it would be utterly destroyed.

However, past experience has usually proven the reliability of these signs, and the motorist trusts the highway department, chamber of commerce, or other agency responsible for their erection, and proceeds without question.

Confidence in signs is by no means new, nor is it limited to those of our roadsides. In colonial days we found the hatter, bootmaker, and other artisans establishing themselves in business after long apprenticeships in their trade. They made more than just hats or boots; they built a reputation on which their success depended and the sign of a clever workman became the beacon of quality for the people of the town and the surrounding countryside.

In those early days, living conditions were quite simple, and the householder had but few decisions to make regarding the quality of his purchases. If he decided to build a house, its walls would be made of local stone or wood, and the roof of hand-split shingles from nearby white pine, cedar, or cypress trees. The industrious housewife spun her own yarn and wove her own cloth with which to make the family clothing; she compounded her own soap from fat and bleached hardwood ashes; made her brooms from alder branches or broom corn, and generally provided for most of the family needs. The garden and pasture field, supplemented with game and wild fruits, supplied the necessary food.

Specialization in trade.

Conditions gradually changed, however, and men realized that some could do things better than others. Along came the butcher, the baker, and candlestick maker, who sold their own products and bought others to satisfy their needs. Specialization continued and instead of one man making a single product, he contributes to the making of one part of a product under highly developed factory methods of to-day.

Production increased, and with it competition became keen. Competition led to lower prices, and accompanying the lower prices there was too often a lowering of quality to meet the price. Many new products have found their way on to the market causing a competition, not within industry but actually between industries, and while life to-day unquestionably contains more leisure, it is likewise infinitely more complex. Heating of one's house involves the choice of five or six different methods: Wood, coal (six or eight grades), gas, electricity, and numerous grades of fuel oil. The inside walls of a home might be made of any one of several hundred products, ranging from ordinary plaster to lumber paneling, or complex synthetic building boards, while there is no end to the variety of paints, plastic coverings, and wall papers with which the interiors may be decorated. The roof may be made with shingles of a half dozen or more kinds of wood, slate, sheet metal of various sorts, and of a hundred composition roofings, ranging from thin, rolled asphalt felts to stiff, hard-pressed asbestos shingles.

Innumerable brooms and brushes, soaps, textiles, and other household necessities are offered in myriad varieties in which the claims for them are infinitely more confusing than illuminating.

When the purchaser has decided upon a particular kind of wall covering or roofing or other commodity, the question is only half settled. What particular brand will give the desired service? What is good enough to "swear by"? Whose sign of quality can be depended upon?

The buyer is always willing to pay for articles of merit, but he wants some assurance that he will get that for which he is paying. Honest merchants and manufacturers realize that they must keep faith with their customers, but the method of establishing this confidence becomes a serious problem.

Unfortunately there is usually a small but parasitic element in many fields that can survive only on a thriving industry as their host. They contribute nothing to the organized advertising campaigns, they refuse to subscribe to established ethical principles, and their success—spare the term—is attained by quality reduction, price cutting, price discrimination, rebates, and other demoralizing business practices. Little attention is paid to the service which their products will render, they have no concern for the future of the industry, their products are unbranded and unidentified, and their only similarity to articles of merit lies in their outward appearance.

The average buyer has no means of testing or analyzing the commodities which he buys—that isn't his business, but it is his business to see that he gets the best for his money, and in this respect he looks for some sign of quality.

Certification on merchandise establishes confidence.

The progressive manufacturers and dealers in merchandise of honest value would unquestionably like to give this assurance to their customers, for they fully realize that satisfied customers are their biggest asset on the road to success. Many methods have been tried, but the unscrupulous manufacturers claim of a product "just as good" still perplexes the consumer when

there is no well-defined generally recognized basis for comparison.

A housewife, doctor, or nurse goes to buy a clinical thermometer. One is offered without name or other identification. Another is offered bearing a name, a trade-mark, and a serial number, together with a small certificate that reads as follows:

> Place_____ Date_____
>
> We, the undersigned manufacturers, hereby certify that our registering clinical thermometer marked No. — will meet all the requirements and tests as specified in the United States Department of Commerce, Commercial Standard CS1–28 for Clinical Thermometers.
>
> _____
> (Company)

Is there any question as to which instrument would be purchased?

The certification is a guarantee of quality to the purchasers and a basis of honest competition for the manufacturers. There is no question of a "product just as good;" the question becomes, "does the product meet with the specifications—does it measure up to the standard of quality which the manufacturers themselves have established."

There are to-day many groups of manufactured articles, the outward appearance of which is so similar as to baffle any ready comparison of quality by the large majority of buyers without resort to elaborate or expensive laboratory tests, and as a natural consequence these goods are purchased on a price basis with some regard for outward appearance, but with little discrimination as to real quality, except when disclosed after repeated and costly experience. It is a simple matter to compare prices. The great question in the mind of the buyer to-day is the question of quality. An answer to this vital question may be found, as it was in the case of clinical thermometers, in the use of commercial standards for quality.

The great competition to-day is between industries and it is natural therefore that members of a given industry are desirous of setting up minimum quality levels for their commodities in order that the public may buy with assurance and confidence and that their products as a whole shall retain the good will and respect of the purchaser.

Another very potent and important reason for definite commercial standards lies in their providing a common base line of understanding for the industry.

The annual expense incident to the exchange of merchandise if it could be accurately calculated, would be appalling. In addition to depreciation, shipping, packing, and handling costs much time and expense is involved in letter writing and telegrams and, furthermore, ill feeling is often engendered which may be erased only after long and tireless efforts by sales departments. If we dig into the real cause of this stupendous item of distribution cost it is quite safe to say that in the majority of cases exchanges and refusals to accept materials are based on nothing more than misunderstandings—different conceptions possessed by the buyer and seller.

Going a step further we find that these misconceptions are the flower of a loosely woven hit or miss, series of quality designations upon which each manufacturer puts his own interpretations and from which the consumer orders by the use of vague indefinite terms.

With the establishment of a commercial standard of quality definite limitations may be set to classify accurately the various grades of any product, and uniform tests and terminology are decided upon, which become the common language for producers, distributors, and consumers.

Outstanding examples of commercial standards.

Some outstanding examples of a commercial standard established to check an unhealthy industrial condition are illustrated as follows:

Wallpaper is marketed under a label reading as follows: "The manufacturer guarantees this wallpaper to meet requirements of U. S. Commercial Standard CS16–29 issued by U. S. Department of Commerce."

Under the auspices of the division of trade standards, a commercial standard for fuel oils developed by the American Oil Burner Association was unanimously accepted by the industry, and is now of mutual benefit to all concerned.

The movement for the standardization of feldspar illustrates one covering a product that in itself is not sold for general consumption. Through the division of trade standards, the feldspar grinders, together with their customers and others interested, agreed upon a standard classification based on particle size and chemical composition.

Nineteen commercial standards have been formulated and adopted by the interested producers, distributors, and consumers. These standards cover products ranging from clinical thermometers to fuel oils, and a remarkable interest and genuine confidence is being built up in the application and use of these common denominators of trade as "road signs" for the guidance of business in this new decade of distribution.

STANDARD SCREW THREADS

American National Standard Adopted by Industry Effective July 1, 1930

A satisfactory majority of written acceptances from producers and users having been received, the National Bureau of Standards announced on June 2, 1930, that Section I of the American National Screw Thread Tables for Shop Use—Standard Screw Threads may be considered as a commercial standard effective for new production as of July 1, 1930.

A number of producers and users have followed the reports of the National Screw Thread Commission for several years and for such organizations the effective date will indicate no change in practice. The chief purpose of establishing this section of the National Screw Thread Commission's report as a commercial standard is to record the firms who have indicated their intention of following the recommendation as their standard practice as well as their intention to use their best efforts in securing its general adoption.

The commercial standard covers limiting dimensions and tolerances for classes 1, 2, 3, and 4 fits of the American National coarse-thread series and fine-thread series, as well as sizes for tap drills recommended for the American National coarse-thread and fine-thread series. The tables given comprise the most essential dimensions as recommended by the National Screw Thread Commission and are arranged primarily for shop use.

STANDARDIZATION OF FARM PRODUCTS FACILITATES TRADE

Large-Scale Operators Recognize Standardization as Basic Requirement for Success

The standardization of farm products, whereby foods, feeds, and fibers are graded according to quality, has been an outstanding development of modern American agriculture. A list of standards issued by the United States Department of Agriculture in the last 15 years includes more than 50 farm commodities. These standards have been adopted by the various State departments of agriculture.

Although the use of the Federal standards by producers and shippers is optional in most cases, an increasing proportion of farm products is being sold on the basis of grade. The standards meet the modern merchandising requirement of sorting commodities according to quality so as to put them to the best use for which they are suited. They also facilitate business by providing a common trade nomenclature to designate quality.

Despite the increasing use of standards, the Department of Agriculture says, in a publication on the subject, that there is still considerable discussion as to whether it pays to grade agricultural products. The department points out that standardization is a means rather than an end in itself. Whether or not the producer or marketer is compensated for the additional effort and expense involved in making such classifications depends, says the department, upon his subsequent marketing practices and upon the trade demand for standardized products.

"For example," the department says, "a country merchant seldom establishes price differentials for different grades when buying eggs from producers in very small lots. In contrast, large assemblers of eggs find it highly desirable to grade their shipments so that throughout the regular trade channels they may be bought and sold according to accepted commercial grades. As a general statement, it may be said that the smaller the volume of business the less likely it is that grading to generally recognized standards will pay. In large-scale operations, however, standardization is now universally recognized as a basic requirement for success.

"Broadly considered, the purpose in establishing standards is to facilitate all of the marketing processes. Farm products may pass through many hands in moving from the centers of production to the wholesale markets. Many products are sold under contract for future delivery, and a large part of the business is transacted at long range. It is essential that there be a common language to insure mutual understanding between buyer and seller. But it usually is neither necessary nor desirable in such commercial transactions to require, in minute detail, specifications as to each factor influencing market quality. A general grouping of the product into grades of the same range of value or utility is usually sufficient."

The department's publication on this subject is entitled "National Standards for Farm Products." It gives an outline of the development and growth of standardization, tells how the standards are formulated and established, and discusses the factors that determine the standards for each of the various farm commodities.

REVISION OF FEDERAL SPECIFICATIONS

Specifications Proposed for Revision Submitted for Comment and Criticism

Forty-seven revised specifications, proposed for the National Government, are now before the departments and others interested for comment and criticism. These specifications, in accordance with the scheme used with the Federal Standard Stock Catalogue, also bear the new designation. For copies of the proposed revisions or for further information pertaining to the specifications, address the Federal Specifications Board, The National Bureau of Standards, Washington, D. C.

F. S. No.	Commodity	New designation
5	White-lead; basic-carbonate (dry, paste in oil and semipaste in oil).	TT-W-251.
15	Paints, green (ready-mixed; semipaste)	TT-P-71.
39c	Tubing, rubber	ZZ-T-831.
48c	Hose, water and wash-deck	ZZ-H-611.
163	Ink, copying and record	TT-I-521.
166	Ink, stamp-pad	TT-I-556.
167a	Ribbons, typewriter	DDD-R-311.
168a	Ribbons, hectograph	DDD-R-291.
169a	Ribbons, computing and recording machine	DDD-R-271.
192	Brushes, casting	H-B-151.
193	Brushes, scrubbing, clothes	H-B-521.
194	Brushes, cuspidor	H-B-171.
195a	Brushes, dauber, long-paddle	H-B-181.
254c	Denim, brown (shrunk)	CCC D-161.
255b	Denim, brown (unshrunk)	CCC-D-171.
256c	Denim, blue, indigo (sbrunk)	CC-C-D-151.
257b	Denim, blue, indigo (unshrunk)	CCC-D-156.
264a	Waste, wool, colored	DDD-W-116.
266a	Ink, marking, indelible (for) fabrics	TT-I-542.
268a	Brick, fire-clay	HH-B-671.
334a	Clay, fire	HH-C-451.
335a	Refractories, fire-clay, plastic	SS-R-191.
363	Safes, burglar-resisting	AA-S-71.
364	Salt, table	
364	Sauces	
389	Mincemeat	PP-M-351.
406b	Brushes, sash-tool, oval	H-B-491.
421	Metol	U-M-191.
469	Steel, structural (for) ships (other than naval vessels)	QQ-S-751.
490	Tubes, aircraft steel, seamless	WW-T-701.
512a	Brushes, flowing, badger hair	H-B-251.
513a	Brushes, flowing, squirrel-tail-hair	H-B-261.
514a	Brushes, flowing, skunk hair	H-B-256.
517a	Brushes, radiator, bronzing	H-B-451.
519a	Brushes, stencil (flag ends cut)	H-B-621.
520a	Brushes, stencil (flag ends preserved)	H-B-626.
521a	Brushes, varnish, flat (triple X thickness)	H-B-706.
522a	Brushes, varnish, flat (double X thickness)	H-B-701.
523	Brushes, stippling, wall	H-B-636.
524b	Brushes, whitewash	H-B-731.
525a	Brushes, dust, painters', flat	H-B-211.
526a	Brushes, dust, painters', round	H-B-216.
	Boxes, packing-and-shipping, plywood cleated	NN-B-601.
	Boxes, wooden, nailed and lock-corner construction, empty	NN-B-621.
	Coke, foundry	Q-C-571.
	Cloth, awning	
	Diatomaceous silica	

METHODS OF PRODUCING PAPER IMPROVED BY RESEARCH

Laboratory and Semicommercial Mill Maintained to Test Products and to Study Industrial Processes

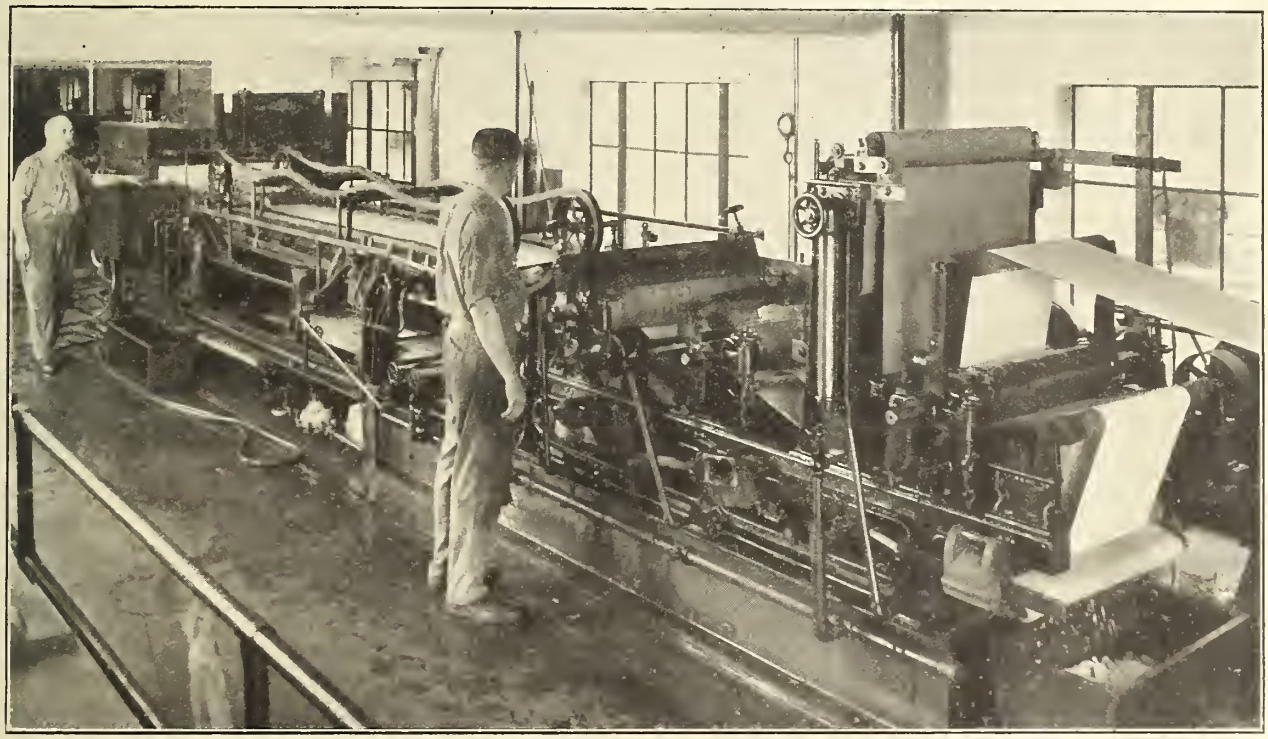
By B. W. Scribner, *National Bureau of Standards*

In the paper section of the National Bureau of Standards are personnel and equipment which make possible a wide variety of useful services to the public.

It has the complete laboratory facilities required for the wide range of testing dealt with in developing paper quality standards and a complete semicommercial paper mill, where studies of paper-manufacturing problems are made.

Tested under constant atmospheric conditions.

To obtain accurate results in making physical tests of paper, paper must be tested under constant atmospheric conditions of temperature and humidity, as it is very susceptible to changes in these conditions.



A view of National Bureau of Standards paper machine used in studies of paper-making materials and processes

For this reason, all such testing is done in special rooms which have "manufactured weather"; that is, the air is cleansed and so treated that the temperature and humidity remain practically constant. Other laboratory facilities are available for the wide variety of chemical and optical testing required.

In the semicommercial paper mill, raw materials can be turned into paper and the paper further processed if desired. There are machines for cutting and dusting fibrous raw materials, for cooking them, and for bleaching and beating the fibers.

The Fourdrinier paper machine makes a sheet of paper 26 inches wide, and while it is small as compared with its commercial brother, it is large enough, as is all of the paper-making equipment, to yield entirely practical results. For further treatments of the paper, a supercalendar for imparting a high glaze and equipment for coating and impregnating paper are provided.

Information service.

The information service on paper has reached considerable proportions. During the past year replies were made to over 1,800 inquiries on paper, some of them requiring tests or experiments in order to obtain the required information.

A large number of visitors call either for discussion of some paticular problems they may have, or to inspect the paper equipment. These personal contacts are welcomed, as more thorough information can be given in this way than by correspondence.

The researches deal mainly with testing methods, development of specifications of quality, and studies of paper-making materials and processes. As the bureau is a research laboratory for the Government, special researches related to Government activities are sometimes made. These usually yield some information of industrial value.

The industrial researches are selected with consideration of the advice of the particular branch of the industry affected in order that the problems selected may yield the greatest benefit to all concerned. Following are details of the various paper researches, including some typical examples:

Improve paper-testing technic.

Progress in the development of quality specifications for paper is dependent to a large extent on the progress made in the development of means of measuring quality. For this reason considerable attention is given to improvement of paper-testing technic.

The results of the bureau's researches on paper-testing standards are made very effective through close co-

operation with the Technical Association of the Pulp and Paper Industry, in the development of official association testing methods. These methods are accepted generally as standards.

Test methods and, in some cases, test instruments required to apply the methods, have been originated in all branches of paper testing. The design of some of the commercial testing instruments has been improved through studies made of them, and in some instances, better means of calibrating and adjusting them have been devised.

Sizing of writing paper.

A study was made for several years on methods of testing the degree of sizing of writing paper—the property which makes the paper resistant to writing ink. In spite of the existence of over 30 methods proposed for this purpose, none of them was found to be adequate, and two new methods were originated which are now in common use in the industry. The "curl sizing tester" was devised for the application of one of the methods.

Similarly, a number of other methods and instruments have been originated. In the field of fiber-composition determination, the Lofton-Merritt method for differentiating between unbleached sulphate and sulphite fibers is the standard procedure. A series of charts showing the color reactions of the common paper-making fibers with the various stains used for their identification was prepared. These charts have extensive use as reference standards in the identification of fibers.

Devices have been developed for measuring the opacity of paper, for finding its resistance to surface wear, for conditioning it preparatory to testing, for measuring the expansion of paper boards, and for calibrating the instrument commonly used to determine folding endurance of paper.

Purity of paper celluloses determined.

Considerable progress has been made in the improvement of methods used in the determination of the purity of paper celluloses, which is of importance in judging the permanence of paper.

The bursting test is the test for strength most commonly used in this country. At the request of a manufacturer of a bursting strength tester, a study was made of several variables present in the usual form of tester, which led to improvements in the design of such instruments and increased their accuracy.

LABELING OF SUBGRADE CANNED GOODS

New Law Authorizes Department of Agriculture to Fix Standards for Products in Interest of Consumers

The Mapes bill (H. R. 730) provides new labeling requirements on lower grades of canned foods, and, described by its sponsors as in the interest of farmers as well as consumers, has become law, receiving the approval of President Hoover on July 8, it was announced at the White House on July 9.

The bill was introduced by Representative Carl E. Mapes, of Grand Rapids, Mich. It amends the general Federal food laws by authorizing the Secretary of Agriculture, in the interest of the consuming public, to require distinctive and informative labeling of canned foods "of grades below certain established minimum requirements."

Representative Gilbert N. Haugen, of Northwood, Iowa, in reporting the measure to the House in practically the same form in which it became law, said that while consumers' protection is the main objective of the proposed amendment, it is believed that it will encourage the growth and expansion of the canning industry, which is one of the most important means of enabling the farmer to move his perishable products profitably. The canning industry represents 6.1 per cent of all manufactured food products in the United States. The increase of its annual output is indicated by comparing the annual production in 1925, which was approximately 7,500,000,000 pounds, and the estimated production for 1928 of 9,000,000,000 pounds.

This amendment will likewise enlarge the possibilities of better credit facilities at lower rates of interest under the Federal warehouse act. Within recent months canned foods have been admitted to the eligible list of products coming under the provisions of the Federal warehouse act. The adoption of this amendment will furnish an additional guaranty as to the quality of canned products in Federal licensed warehouses and will, therefore, be a very great advantage to the whole canning industry.

The bill provides that canned food falling below the standard of quality, condition, or fill of container promulgated by the Department of Agriculture must bear a plain and conspicuous statement indicating that it falls below that standard. It defines canned food "as food in hermetically sealed containers sterilized by heat, except meat and meat food products, and except canned milk."

The bill authorizes the Secretary of Agriculture to determine and promulgate from time to time a reasonable standard for each class of canned food as will, in his judgment, promote honesty and fair dealing in the interest of the consumer; to modify such standards from time to time in the interest of the consumer, and to prescribe the form of statement to be placed on each package of canned food which falls below the standard. The Secretary of Agriculture is required to specify the dates on which the standards shall be effective or the prescribed statements must be used and to give not less than 90 days' advance notice of such dates.

The bill stipulates that it is not to be construed as authorizing manufacture, sale, shipment, or transportation of adulterated or misbranded foods.

On July 10 W. G. Campbell, chief of the Food, Drug, and Insecticide Administration of the Department of Agriculture, stated that the department is formulating standards to be applied under the new law.

DIESEL ENGINE STANDARDS

Standardization Program Adopted by Diesel Engine Division of the Standards Committee of the Society of Automotive Engineers

Standardization for Diesel engines has been recognized for several years as one of the important steps to be undertaken in the development and use of this type of power plant. With the appointment of the standards committee of the Society of Automotive Engineers this year, the Diesel engine division was organized, as it was felt that the time had arrived to develop standards for Diesel engines and to extend many of the existing S. A. E. standards to larger sizes adaptable to Diesel engines.

The difficulties that will be encountered in any standardization program for Diesel engines, because of the wide range of engine sizes and horsepowers, is pointed out by the S. A. E. Journal with the statement that probably standardization for the large industrial types of engine will be more limited than for the types and sizes that will be used for automotive purposes.

Prediction can safely be made that automotive types of Diesel engines will greatly outnumber the larger industrial and marine types, and therefore it is important to set up well-chosen standards that can become established in use before Diesel engines are made in large quantities.

Standards to be developed.

The two subjects considered most important at this time are fuel-feed tubing and the connection dimensions for fuel nozzles in the cylinders. In general, it was believed that tubing diameters should be standardized over a definite range, with two or possibly three series of wall thicknesses. The division is to make a general survey of the tubing now used by the several Diesel engine manufacturers and obtain their recommendations as to a standard.

It is appreciated that standardization of nozzle-mounting dimensions will be difficult because of the great variety now in use, but it is believed that it is very important to the Diesel engine manufacturers, as they emerge from the present stage of development, that nozzle mountings be guided into as few standardized designs as possible. A questionnaire has been outlined for this subject to obtain suggestions from the engine and nozzle manufacturers, with the hope that definite recommended practices could be worked out from the information supplied.

Other subjects listed are the extension of the present S. A. E. standard for connecting-rod bolts up to and including 3-inch diameter, following the S. A. E. or National Fine Series of thread pitches; valves; high-pressure and flared-tubing connections; indicator cocks; fuel-pump mountings and flow-plug sizes. Another of the important items selected is slotted nuts for sizes up to 3 inches. The present standard S. A. E. engine-testing forms are to be reviewed for such modifications as will make them suitable for use for Diesel engines, and a report will be prepared on Diesel engine nomenclature that will probably follow somewhat along the lines of the present S. A. E. nomenclature for automobiles.

GOVERNMENT STANDARD FOR CARBON PAPER

Testing Carbon Paper Under Federal Specification to Insure Legibility of Impressions

By C. E. Waters, *National Bureau of Standards*

The almanac, which was printed probably not later than November, 1929, confidently predicts what the weather will be on December 31, 1930. With equal confidence it can be forecast that even if writing ink and typewriter ribbons give perfect satisfaction, there will be complaints about carbon paper this year.

In its make-up and use, a sheet of carbon paper is not unlike a typewriter ribbon. Each is a device for holding a film of ink ready for convenient transfer to a sheet of paper. Whether the result of the transfer is satisfactory depends in each case upon the nature of the ink and of the fabric upon which it is spread. That the ink in one case is fluid but solid in the other makes no difference in the principle.

Carbon paper for use with standard typewriters generally has a rather hard coating. For noiseless machines the paper must have a softer finish, because the type hit the paper with less force than the type of standard machines. Carbon paper for pencil use is the softest of all.

The coating on black carbon paper contains carbon, but for other colors dye lakes are used. What was said about the permanence of these materials, when discussing ribbons, applies to carbon paper also. As the coating is solid, the pigment is perhaps not driven so far into the paper as the ink from a ribbon, yet, even so, carbon copies have satisfactory permanence if they are not subjected to too much rubbing.

As we have seen, a typewriter ribbon must be thin so that the writing will be as sharp as possible. Carbon paper is under the handicap of making impressions from blows transmitted through the ribbon, through the first sheet, and through its own tissue. At the back the blow of the type is cushioned by the second sheet of paper and by the rubber platen, or roller. It is a wonder that a single carbon copy is so sharp and distinct as it generally is. The Federal specifications (Nos. 425 and 426) for carbon paper indirectly limit the thickness of the uncoated tissue by requiring that it shall not exceed a certain weight.

No attempt is made to specify the composition, thickness, and hardness of the coating, but two practical tests are relied upon to ascertain the quality of the finished product.

If a sheet of carbon paper that has been used but once is held up against the light it is generally possible to read what was written, because each type removes a large part of the coating from the spot it hits. This "stenciling" is permanent because the waxy mixture can not flow as the ink in a ribbon does. So in testing its durability, or the number of successive copies it will make, carbon paper must be judged more leniently than a typewriter ribbon.

Testing carbon paper.

The test is made by fastening a piece of the sample so that it can not move, though the white paper is shifted from line to line as usual. The same letters in exactly the same order are then written ten times, after which the carbon copy is examined. The tenth line should be easily legible, and the decrease in blackness from one line to the next should not be too great. As the same type hits the same spot on the carbon paper each time, this is a more severe test than actual service.

In the latter case the register of the carbon paper is not always the same, nor are the letters and words identical, in the same order, or spaced alike. A sheet of carbon paper that passes the durability test should be capable of making many more than 10 copies of letters in office routine.

Comparatively few samples of carbon paper fail to pass the durability test, in which only one copy at a time is made. Good paper for manifolding, or making several copies at one time, may or may not be hard to get. Federal specification No. 425, for light-weight carbon paper, says that it shall be capable of making "not less than 10 clean, clear, legible carbon copies at a time" when using first and manifold sheets of the weight specified. The intent is to secure copies so clean and clear that even the tenth will be easily legible. It must have no indistinct words whose meaning must be guessed and no numeral should be in doubt.

Because enough letters and words to carry the reader along are found in some very bad carbon copies is not sufficient justification for reporting that the carbon paper meets the requirements of the specification. Yet the testing laboratory may be blamed for not passing carbon paper which yields only pseudolegible copies with the characters far from being clean and clear.

To revise specifications.

The proposed revisions of the two specifications for carbon paper will put the judging of the manifolding test upon a more definite basis, so that a lively imagination will be given less opportunity for exercise. It is proposed that all of the letters of the alphabet, both capitals and small letters, and all of the numerals shall be written twice over in haphazard order. When the last manifold capy is inspected all of the numerals must be legible, but a small number of unreadable letters among the total of 104 will be tolerated. It has been suggested that an ample tolerance would be five illegible letters.

The proposed revision of the specification for light-weight carbon paper, as sent to manufacturers for comment, requires only five manifold copies to be made. This apparently indicates great laxity in the revision, but as a matter of fact this is not true. The reader can prove to his own satisfaction that carbon paper which meets the requirements when judged on the new basis is of excellent quality.

More complete information about the items discussed in this article and the two preceding may be found in Bureau of Standards Circular No. 95, Inks, Typewriter Ribbons, and Carbon Paper, and in the books listed at the back of that circular. The Superintendent of Documents, Government Printing Office, Washington, D. C., sells the circulars for 10 cents each.

TRANSPORTATION AIDED BY RESEARCH

Transport is the Seven-Leagued Boots of Commerce; Equipment Standardized on High-Quality Basis

By Henry D. Hubbard, *National Bureau of Standards*

(Third and concluding article of the series on transport research by Mr. Hubbard)

Autographic measuring instruments are often made the observers and recorders of experimental motor research. A notable example is the National Bureau of Standards' observation car designed to automatically record its own performance with respect to 16 items of motor and car behavior under variable service conditions on the road. The design was made available to the automotive laboratories of the country.

Among the road service researches was a study of the practice in using brakes. The psychological reaction of the drivers was measured as a basis for safety codes for brakes. A device, the decelerometer, was invented at the bureau to measure the rate of stoppage of a car when the brakes are applied; another device measured the reaction time of the pilot and brakes combined.

The success of the automotive research at the Bureau of Standards rests first, upon 70 or more specialized fields of physics, chemistry, and technology, each with its unique staff, equipment, and tradition; second, its close cooperation with the great technical and industrial organizations concerned with each research. Then, too, Government units are authorized by law to transfer funds for specific researches, and industrial units are permitted to maintain research workers in their pay at the Bureau of Standards for cooperative research on problems fundamental to their industries. A good example of cooperative research is the brake-lining research, as a result of which the service life of brake linings was increased fifteenfold through the location and measurement of failures by means of the bureau's life-test device for brake linings.

Commerce makes, moves, and sells; that is, produces, transports, and markets. Transport links maker and user. Utility of place and time are vital elements in almost every business enterprise.

Results of standardization.

More notable are the results of standardized production where standard machines, processes, and practices unfailingly yield reproducible quality under standard measured controls, or enhance quality as research makes possible. In transport by land, sea, and air, standardization touches new needs, new forces, and new arts still in the making. These involve scientific discovery and engineering. Here manufacturers may seek at least temporary standardization, while daring design and invention of experimental and racing craft for land, water, and air give little promise of finality.

A temporary climax is reached in the commercial self-steering, self-stabilized plane and in the blind flying of the consolidated *N. Y. 2* and the *Vought 0211*. And now the Department of Commerce through its Bureau of Standards has made possible blind landing by the use of the new combined directive beacon, marker beacons, and landing beams. The landing path is marked out by the radio beam perceptible 3 miles from the landing point. By keeping the plane set so that the indicator is at a fixed point, the plane glides to earth easily and accurately in the thickest fog or in absolute darkness.

This century has brought transport facilities to the door of every home, riding roughshod in tractors over unbroken land and trackless forests, though tubes and pipe lines, diving and riding under the sea, flying over uncharted mountain ranges mapping on the way, over the poles of the earth, and skimming the waves in motor boats.

Indoor elevators, escalators, conveyors, and trams provide diverse movement for persons and things. Electric energy is projected hundreds of miles over copper circuits; while millions of messages—sound and sight—ride the wires or fly through space with the speed of light.

While waterways make transportation cheaper and aircraft gives it all degrees of directional freedom, electric energy is instantaneous in its flight. Transport is the 7-leagued boots of commerce. It advances by leaps and bounds. Research and standardization are the means to such progress, while measurement is the method of discovery and of application. Together they tend to make transportation swift, efficient, and universal.

Commerce is the union of the practical and the ideal. It diffuses civilization. It returns vast benefits. Its galleons—argosies full of bounty—sail every sea, make life possible everywhere. As life is sustained by the circulation of the blood, so is commerce sustained through the arteries of transportation.

Transportation is high enterprise in mutual aid. Through it we share the ever-increasing benefits of creative arts set to automatic machines. Through commerce the world expands, while every community becomes complete and integral, enjoying all the products of nature, art, and industry in other lands.

NEW SECTION CREATED WITHIN BUREAU OF STANDARDS

Duties Will Be to Prepare Federal Specifications for Certain Organic and Fibrous Commodities

To facilitate the services which the National Bureau of Standards renders in the preparation of Federal specifications and in the testing of certain commodities purchased by the Government, a new section has been created within the bureau to handle all work of this character on rubber, textiles, paper, and leather, under the leadership of P. L. Wormeley, for many years chief of the rubber section.

The organic and fibrous materials division of the bureau, which at present is made up of four sections dealing with the materials mentioned above, is called upon to perform a considerable amount of the total specification and test work referred to the bureau by the various Federal purchasing agencies. Heretofore no distinction has been made between research and testing in this division, the same staff being employed for these two very different kinds of work; that is, all tests on rubber have been cared for in the rubber section, paper tests by the paper section, etc. The staff has been required to drop research work to perform urgent tests, and, conversely, has been unable to devote the necessary time to the drafting of new specifications, and to the study of existing specification requirements.

Unfamiliarity with these requirements often results in considerable delay in performing the tests. Likewise, it has been impossible to secure the necessary flexibility of personnel, since the staff of each section is familiar only with tests of one commodity. This has meant that although test samples might be piled up in one section, with very few on hand in another, there was no way of transferring the personnel to help carry the load.

Scope of new unit.

Under the direction of Mr. Wormeley, a section will be built up of experts on Federal specification requirements and on test methods covering every kind of commodity with which the division deals. When it is remembered that more than 9,000 test items representing 200 commodities were tested by the division last year it is obvious that the new section will have plenty of work to do. It is believed that the new arrangement will permit the testing work to be done with the same reliability as heretofore, but with greater promptness and less cost.

During his 26 years of Government service Mr. Wormeley has had broad experience in the testing of many kinds of materials. As chairman of the technical committee on rubber products of the Federal Specifications Board he has gained intimate knowledge of the development and application of Federal specifications. Dr. Archibald T. McPherson has been selected to fill the vacancy caused by the change of duties assigned Mr. Wormeley. This rearrangement became effective July 1, 1930.

CURRENT ACTIVITIES OF THE AMERICAN STANDARDS ASSOCIATION

Several Specifications Under Revision by Technical Committees

There is given below up-to-date information relating to developments taking place in certain standardization projects being carried forward under the auspices and procedure of the American Standards Association.

Bearings.

Proposed standards for annular ball bearings and for annular ball and roller bearings, wide type, have been approved as American standard and American recommended practice, respectively. The new standard specifies the boundary dimensions an dtheir tolerances, of annular ball bearings as affecting their interchangeability. Features, such as ball raceways, size and number of balls, ball retainers, capacities, and speeds depend upon the designs and practice of individual manufacturers or the requirements of individual users and are not considered essential for standardization. The standard for ball and roller bearings, wide type, include the regular standard light, medium, and heavy series of wide type, annular ball bearings of the Society of Automotive Engineers, and extended sizes to supplement the regular light and medium series only. Sizes larger than the heavy, regular series are considered too large and heavy for general use and are therefore not included in the recommended practice.

The bearing dimensions apply to both the ball and roller types of bearings to provide for complete interchangeability. The regular light, medium, and heavy series were adopted originally by the S. A. E. for automotive uses. The extended sizes were developed later primarily for use in industrial electric motors, but all three series throughout their entire range of sizes are suited to other applications where special conditions do not govern.

Drain tile.

The American standard "Specifications for Drain Tile," under the sponsorship of the American Society for Testing Materials, is now before the A. S. A. sectional committee for revision. The following changes have been suggested: (1) Inclusion of a requirement for rate of applying load in making strength tests. (2) Revision of the strength test requirements to provide a closer correlation between required test strengths and loads for specified depths of pitch. (3) Inclusion of standards and tests covering durability in acid and alkali soils. (4) Revision of the requirements for the lower 3-edge bearing when testing large tile, and the inclusion of the "Minnesota" bearing (lower sand-bearing and upper 3-edge bearing).

Dry cells.

The sectional committee in charge of the project "Specifications for Dry Cells and Batteries," has approved the revised specifications which have been under consideration and has submitted them to the A. S. A. for approval. The standard of performance requirements in the new specifications has been raised in a number of instances over the requirements in the present standard. In submitting the revised specifications, the National Bureau of Standards, sponsor for the project, stated that the specification in identical in all technical requirements with that which is being submitted to the Federal Specifications Board for approval as a Federal specification, but the form and arrangement of the two specifications differ decidedly. For the latter, the arrangement has been made to conform to the present requirements of the Federal Specifications Board.

Fire-fighting equipment.

The American Mining Congress and the National Fire Protection Association, joint sponsors for the proposed American recommended practice for "Fire-Fighting Equipment in Metal Mines" have submitted this standard to the A. S. A. for approval. The proposed standard covers fire-preventive measures and minimum facilities and equipment required for fire fighting in metal mines, including water supply, hose, fire extinguishers, sprinkling systems, availability and care of oxygen rescue apparatus, fire signals, regulations governing fire doors, fans, and control of ventilating during mine fires.

Pipe and tubing.

Following a group of meetings of its subcommittees on plan and scope and on pipe and tubing for high and low temperature service, the sectional committee on wrought-iron and wrought-steel pipe and tubing met in Detroit on June 10. The committees reported progress on the development of a basic formula for wall thickness for all sizes of pipe and on the preparation of specifications for various types of pipe for which no specifications are in existence.

Electrical definitions.

Fifteen subcommittees have been appointed to carry on work on the project "Definitions of Electrical Terms." The chairman of these committees will form an executive committee which will hold regular monthly meetings. The work is progressing rapidly, and it is expected that within a few months final reports of several subcommittees will be available for general criticism and suggestion. Preliminary reports of subcommittees Nos. 3 and 8, on transformers and transportation, respectively, have already been circulated to members of the sectional committee for criticism and comment.

When the work of the sectional committee is completed, there will be available to American industry a standard glossary of electrical terms which will be exceedingly useful in the preparation of specifications and contracts.

It is interesting to note that in the organization of this sectional committee the sponsor, the American Institute of Electrical Engineers, invited several of the larger companies publishing dictionaries to appoint representatives. In every instance the publishers replied that they did not desire representation but would be glad to use the committee's report in compiling future editions of their dictionaries.

Factory lighting code.

The A. S. A. technical committee on the "Code of Lighting; Factories, Mill, and Other Work Places" has completed its work on a new edition of the code. The Illuminating Engineering Society, sponsor for the project, has approved the new code, and it is now before the standards council of the A. S. A. for approval as American standard. Many of the recommended values and the specifications for illumination for different classes of work have been changed. There has also been a general revision of the discussion of the advantages of good lighting and methods of securing it.

Tolerance systems.

An article discussing the relative merits of the unilateral and bilateral systems of tolerances, by John Gaillard, mechanical engineer of the American Standards Association, has been reprinted, and copies are now available through the A. S. A. information service. The article, which was entitled "Application of Tolerance System Depends Upon Nature of Production Process," appeared in the April 26, 1930, issue of Automotive Industries.

Refrigeration safety code.

The American Society of Refrigerating Engineers, sponsor for the "Safety Code for Mechanical Refrigeration" has approved the code recently completed by the technical committee in charge and has submitted it to the A. S. A. standards council for consideration with respect to its approval as American standard. The code covers the safe installation, operation, and inspection of refrigeration systems, and the storage of refrigerants. It applies to all refrigerating equipment employing fluids which are vaporized and liquefied or compressed in their refrigeration cycle.

Committees on small tools.

Technical committees on electric-welding dies and electrode holders, milling-machine tables, splined shafts, and splines were organized in connection with the meeting of the American Society of Mechanical Engineers in Detroit, June 9 to 13. The committee on splined shafts and splines will review the dimensions developed by the Society of Automotive Engineers, and will further develop spline standards for use in other industries.

The scope of the committee on milling-machine tables will be the standardization of table lengths and widths of milling machines, including distances between slots to facilitate interchangeability of fixtures. The committee on electric dies and electrode holders will determine the scope of its work following the return of a questionnaire which is being sent to producers and consumers by the committee.

Code for floor and wall openings.

The technical committee in charge of the "Safety Code for Floor and Wall Openings, Railings, and Toe Boards" and the National Safety Council, the sponsor organization, are inviting constructive criticism of the code in order that the final draft may represent the best expression of available knowledge on the subject. The latest tentative draft of the code has been printed by A. S. A. and can be obtained through the A. S. A. information service.

HOME HEATING PROBLEMS

List of Published Data Available

A list of published information on home heating problems has just been compiled by the National Bureau of Standards. Publications issued by the Department of Commerce describe the requirements for chimney and fireplace construction, the painting of steam and hot water radiators, the use of domestic and industrial fuel oils, tests of coal, methods of saving fuel in heating houses; and the use of natural gas, coke, and its by-products.

The publications of the Department of Agriculture relate to the operation of home heating plants, furnaces, oil burners, and also describe methods of building chimneys and fireplaces, and the use of wood for fuel.

Some publications issued by associations, other than Government departments, are also listed. They give useful information regarding methods of installing furnaces; and the operation of various kinds of heating equipment, including oil burners, warm-air furnaces, and fireplaces.

A number of magazine articles covering heating methods and problems are also shown in the list. They may be consulted in local libraries, and are thus available to anyone who may be interested in improved heating methods. The prices and ways of obtaining publications are described in the list.

PROPOSE TO STANDARDIZE PLUMBERS WOODWORK

Industry Has Asked Cooperation of National Bureau of Standards in Promulgating Commercial Standards

The National Bureau of Standards has received a request from the Institute of Plumbers Woodwork to cooperate in the establishment and promulgation of a commercial standard for their products. A representative of the bureau met with the institute in Detroit on July 22 to assist in formulating plans for the standardization program. This project is another link in the chain leading to the standardization of all plumbing materials in which the manufacturers of vitreous china plumbing fixtures and porcelain (all-clay) plumbing fixtures have already cooperated with the bureau in preparing Commercial Standards CS20–30, "Staple Vitreous China Plumbing Fixtures" and CS4–29, "Staple Porcelain (All-Clay) Plumbing Fixtures."

The standardization of the various materials used in plumbing and the elimination of many articles and devices infrequently used, has long been the desire of architects, sanitary engineers, manufacturers, and distributors of plumbing supplies, plumbers, home owners, builders, and governmental authorities. This standardization can only be brought about by the concerted action of the above groups and, unfortunately, some individuals comprising a very small minority, are indifferent, while a few are actually opposed to the idea.

STANDARD FOR STEEL PIPE FLANGES AND FLANGED FITTINGS

American Society of Mechanical Engineers Subcommittee Holds Meeting to Consider Provision of Standard

The question of increasing the pressure ratings of the existing 250, 400, and 1,350 pound steel standards to 300, 450, and 1,500 pounds, respectively, at 750° F., was taken up at the meeting of the subcommittee of the American Society of Mechanical Engineers on steel pipe flanges and flanged fittings, held in New York. The matter of the possibility of extending these standards to include equipment for 150 pounds as the lower limit was also considered, and for the latter it was suggested that the dimensions of the present 125-pound cast-iron standard be used, but in conjunction with reduced temperature ratings.

During the discussion at the meeting on the 200 and 400 pound standards it developed that in some sizes the flange and wall thicknesses would have to be increased, or, as an alternative to this, alloy steel with a higher yield point might be used and the existing dimensions retained. On this point action was deferred until it could be ascertained how the increase in wall and flange thicknesses would affect the present patterns of steel valves and fittings. In connection with the rerating of the 1,350-pound standard it was decided that, for sizes of 12 inches and under, it should be rerated at 1,500 pounds and 750° F., employing alloy steel in accordance with specifications to be drawn up by the American Society of Mechanical Engineers; also that a new subgroup be appointed to continue this study and to complete the work already started on the larger sizes from 14 to 24 inches in the 1,500-pound class.

Steel base fittings were discussed, and inasmuch as it was reported that the Manufacturer's Standardization Society of the Valve and Fitting Industry has already adopted a standard for these, which accurately represented accepted practice, it was voted that this be included in the proposed revision of the American steel flanged fitting standard.

The difference existing between the present 250-pound cast-steel and cast-iron standards in the matter of flange thickness for certain sizes was mentioned, as was the possibility of extending the steel standard to cover sizes below 2 inches, but it was deemed advisable, for the present at least, to take no action in connection with either of these points.

At a previous meeting, the subcommittee decided to eliminate the 3½-inch size from all pipe flanges and flanged fitting standards, but it was reported that the M. S. S. V. F. I. were proceeding with a canvass of the manufacturers in order to ascertain the practicability of this step, the subcommittee decided to reconsider its former decision and delay any action until such a time as a further report might be available.

Considerable interest has been shown in standards for pressure ratings higher than 1,500 pounds and in reponse to this, it was stated, two preliminary standards had been drafted for 2,500 and 3,500 pounds at 1,000° F. These were based on the expectations that an alloy steel with a working stress of not less than 14,000 pounds would be developed. As the demand for data on such equipment was increasing more rapidly than had been anticipated, a committee of two, with the privilege of adding to its personnel as might be found necessary, was appointed.

Based on replies to a questionnaire sent to a selected list of 536 engineers, on their expressed opinion, it was recommended that no changes in the thicknesses as covered by the tentative American standard for steel pipe flanges and flanged fittings, be considered at the present time. It was, however, recommended that the recently developed dimensions for optimum hubs be checked and prepared for submission to the subcommittee.

STANDARD COLORS FOR ARMY UNIFORMS

Eighteen Standard Colors Adopted for Military Service

The colors which have been authorized for wear on the blue uniforms of the United States Army have been standardized and are portrayed in the United States Army Color Card just issued by the Textile Color Card Association of the United States (Inc.). This card contains 18 colors and has been approved and accepted by the Quartermaster General of the Army, according to the Quartermaster Review.

The purchasing depots of the Quartermaster Corps will use the card as the standard for shade whenever any textile articles are required, such as facing cloths for stripes, chevrons, cape linings, shoulder insignia, etc. cord edge, braids for dress coats and cap band ribbons for dress caps, to indicate the various branches of the military establishment.

In preparing the card, the Textile Color Card Association has worked in closest cooperation with the Quartermaster General's Office. Every color was dyed to the standard on file with the War Department and passed on and accepted by the Army experts.

USE OF QUALITY LABELS IN NEW ENGLAND MARKETS GAINS

Total of 3,290,256 Such Labels Sold to Date

More than half a million New England quality labels have been sold in connection with the farm marketing program during a 4-month period of this year, according to the New England News Letter for July, 1930. The number of labels sold in May amounted to 172,275, making a total of 667,550 labels sold since February 1, and bringing the total number of labels sold since the program was put into effect to 3,290,256.

The number of users of the label now stands at 869, the new users in the past four months amounting to 185. This number by no means represents the total number of producers using the label, for each cooperative sales organization is listed as one user whereas it may represent hundreds. In addition, 1,074,539 boxes and wrappers have been sold to 320 users.

The Massachusetts Department of Agriculture has been asked by a large tomato growers' cooperative to establish tomato grades and thus make the New England label available to tomato growers. This request is a direct result of the success of labeled strawberries on the market this summer.

STANDARDIZATION BRIEFS

A simplified practice recommendation covering dimensions and allowable loads per linear foot of open-web steel joists was unanimously approved at a general conference of representatives of the industry, held under the auspices of the division of simplified practice of the National Bureau of Standards, at Cleveland, Ohio, on July 15, 1930. A standing committee, composed of representatives of manufacturers and users, was authorized by the conference. It is expected that this simplification will greatly reduce existing confusion in the design of open-web steel joist construction. The recommendation, subject to approval of the industry, will be effective as of October 1, 1930.

The Society of Automotive Engineers announces the establishment of a new subdivision of its aircraft division, which will be known as subdivision No. 5. The standardization of such fuel-system parts as tube clips, fuel valves, hose nipples, tank flanges, hose and hose liners, has been referred to this subdivision for study and recommendation as it finds possible to make.

Heavier construction, longer leader pin bearings, and actual rated die space are among the features of the line of standardized die sets built by the U. S. Tool Co., of Ampere, N. J.

The standardization committee of the International Association of Milk Dealers recently held a meeting to review the progress that is being made with the variety survey in connection with sizes and dimensions of jars for cottage cheese and sour cream. The accumulating data will form the basis for a simplified practice recommendation to be proposed at a general conference this fall.

A preliminary conference to consider the simplification of trunk sizes was held in conjunction with the convention of the Trunk, Luggage, and Leather Goods Manufacturers of America, in July, 1930. Tentative recommendations have been approved and the National Bureau of Standards has been requested to arrange a general conference of all interests for the purpose of formulating a simplified list of trunk sizes. Recognizing the commercial value of establishing such a list, a survey committee was organized to study the needs of the traveling public and to determine the potential economy to merchants who now find it necessary to carry extensive stock of trunks.

The testing of a 50-pound balance and the primary standards of length, mass, and capacity, for the State of Maine has been completed by the National Bureau of Standards. It is required by law that these standards be submitted once every 10 years for verification.

A revision of the specification dealing with hard-drawn copper (solid and stranded) circular conductors for overhead energy transmission purposes, has been issued by the British Engineering Standards Association.

The numbered highways of the United States have become the main streets of the Nation, the Bureau of Public Roads recently stated in connection with its announcement that the work of erecting standard markers along the 97,000 miles, embraced in the system, will be practically completed at the end of this year's construction season.

The standing committee for simplified practice recommendation No. 4, Asphalt, has announced the reaffirmation of this project, without change, for a period of one year. A survey of production for the year 1929, conducted prior to the recent revision meeting, indicated the degree of adherence to the recommendation to be approximately 89 per cent.

A new edition of the National Elevator Safety Code is in course of printing by the American Society of Mechanical Engineers, joint sponsor with the National Bureau of Standards for this code.

Simplified practice recommendation No. 98, Photographic Paper, has been reaffirmed, without change, for another year. A survey of the 1928 production of photographic paper, conducted prior to the revision meeting, indicated the degree of adherence to the recommendation to be approximately 96 per cent.

Standard samples of mica obtained by the Bureau of Mines from Georgia, North Carolina, Maine, New Hampshire, Argentina, Guatemala, India, and Madagascar have been tested recently at the National Bureau of Standards. The results show that power losses at radio-frequency are no greater in the clear domestic mica than in the clear foreign material. Earlier measurements showed that the domestic material is at least equal to the foreign in dielectric strength.

Simplified practice recommendation No. 116–30, Dental Brush Wheels, is now effective. A sufficient number of signed acceptances have been received by the division of simplified practice from manufacturers, distributors, and users, to insure the general adoption of the program by the industry.

During the fiscal year ending June 30, 1930, a total of 560 standard cells were tested and certified by the Bureau of Standards.

Simplified practice recommendation No. R79–28, Malleable Foundry Refractories, has been reaffirmed

by industry, without change, for another year. This recommendation has been instrumental in reducing the stock shapes and sizes of brick and tile for malleable foundry refractories from 188 to 15, or 92 per cent.

The Government specifications for large and for miniature tungsten lamps are being revised by the electrical supplies committee of the Federal Specifications Board with the assistance of lamp manufacturers. The number of lamps inspected on Government purchases during the last fiscal year exceeded 2,000,000.

A problem under investigation at the National Bureau of Standards is the effect of ultra-violet light upon the transmission of special window glasses used in solariums.

Methods of measuring the ultra-violet component radiation in sunlight useful for healing purposes. The ultimate object in view is the establishment of a unit of dosage.

The beef grading and stamping service of the Department of Agriculture will soon be extended to several additional slaughtering centers. The quantity of beef graded and stamped in the last five months was 62 per cent greater than in the corresponding period of last year. It is in response for wider service that the activities are to be extended.

Tests have been completed at the National Bureau of Standards on 36 pocket watches, 13 bracelet watches, 9 stop watches, 8 flight test stop watches tested at −25° C., and automobile race timing device.

STANDARDIZATION OF WOODRUFF KEYS

The standardization of Woodruff keys is one of the projects undertaken by the sectional committee on standardization of shafting, which was organized in October, 1922, by the American Society of Mechanical Engineers, under the procedure of the American Standards Association.

The sectional committee at first gave its attention to the formulation of a tentative American standard for cold-finished shafting. It later developed tentative American standards for plain, taper, and gib-head stock keys, and a code for the design of transmission shafting. Finally, in December, 1925, the standardization of Woodruff keys was undertaken by the committee.

The subcommittee on Woodruff keys made a study of existing sizes and fits, and in June, 1926, submitted to the larger users a preliminary proposal for review and criticism. Several revisions were found necessary before the proposal was approved by the subcommittee, and on March 16, 1929, preliminary copies were widely distributed to industry for criticism and comment. The proposal has been further revised in accordance with the suggestions received and approved by the sectional committee.

STANDARDIZATION OF IRON AND STEEL BARS

On June 3 the sectional committee on the standardization of stock sizes, shapes, and lengths for hot and cold finished iron and steel bars of the American Society of Mechanical Engineers held its organization meeting in New York. The scope of the committee was thoroughly discussed, and as a result the organization of three subcommittees was authorized as follows: (1) Hot-rolled steel, (2) cold-finished steels, and (3) hot-rolled iron.

The members of the committee were of the opinion that for the present these subcommittees will be able to handle the scope of its work, which has been tentatively outlined as the standardization of the dimensions of cross section and length of hot-rolled and cold-finished iron and steel bars having the following shapes: (1) Rounds, (2) squares, (3) triangular sections, (4) hexagons, (5) octagons, (6) half-rounds, (7) square-edge flats, (8) nut-steeel flats, (9) beveled-corner squares, and (10) round cornered squares; including tolerances on the dimensions of such bars. Nationally recognized standards are to be accepted where possible. It was also agreed to include half-ovals and reinforcing bars in this tentative scope.

CERTIFICATION OF MAPLE FLOORING

Car Card Method of Certification Protects Consignees

As a measure of protection and assurance to consignees, the Maple Flooring Manufacturers Association has announced that its membership has adopted the "car card" method of shipment certification now being effectively used by leading lumber manufacturers' associations in this country. This method of quantity and quality certification is practically universal.

In announcing adoption of the car card, or shipper's certificate of car contents, E. C. Singler, the secretary of the association, points out that in addition to the guaranty afforded by the card, there is an assurance to the retailer or other carload buyer, that their orders have been met in a definite way.

The card is sealed inside the car door in a waterproof envelope to be delivered immediately to the consignee's purchasing department upon opening the car. It contains a statement of the kinds of wood in the shipment, the grades of the flooring, the total number of feet, the size (thickness and face) of the shipment make-up, and the identification number or mark of the mill. Manufacturers may also "bury" a duplicate card in the shipment to insure the consignee receiving at least one of the copies.

THE INTERNATIONAL INSTITUTE OF AGRICULTURE AT ROME

Relation to Standardization of Agricultural Statistics and Scientific Research

By Leon M. Estabrook, *Ex-Director of the World Agricultural Census*

In 1904 David Lubin, a successful merchant of Sacramento, Calif., conceived the idea that the buying and selling and, therefore, the prices of the bread grains of the world, the principal food of mankind, should be standardized to the extent that the Governments of the world should assume responsibility for issuing crop reports and statistics of agricultural production, distribution, stocks and consumption, to insure that such reports and statistics should be unbiased and as complete, accurate, and comparable as it is possible to make them, and that a central international coordinating agency or clearing house should be set up to standardize methods, summarize, and publish results for the information and guidance of all alike.

After failing to interest the Governments of the United States, Great Britain, France, Germany, and Austria, Lubin succeeded in securing the support of the Italian king and Government. The international convention which met in Rome in June, 1905, drew up a protocal providing for the establishment of the International Institute of Agriculture at Rome to be maintained by contributions from the member Governments, which 74 Governments have since adopted by formal treaty.

The convention provided for three main divisions for the collection and dissemination of information from member Governments, agritechnique, agricultural statistics, and agricultural economics, and for an administrative organization, for a permanent committee made up of delegates from member Governments to serve as a board of directors, and for a general assembly to meet biennially to formulate programs, review the work accomplished, and to provide for a budget.

The institute was organized and began to function in 1909. Its greatest development and best service have been in the field of agricultural statistics. In the beginning many countries were found to be without agricultural statistical organization and service and among those that maintained such services there was great lack of uniformity and corresponding lack of comparability. This was especially true of agricultural censuses, which are usually the bases for annual estimates of crop and livestock production.

The need for more complete and comparable census data was discussed at general assembly meetings of the institute, at the biennial meetings of the International Institute of Statistics, and other international conventions, but nothing was done about it until in 1924 a cooperative agreement was entered into between the institute, the International Education Board, and the United States Department of Agriculture, to undertake the organization of a world agricultural census in 1930, most of the funds required for the preliminary work being supplied by the International Education Board.

Early in 1925 a census office was established at the institute with a director detailed from the United States Department of Agriculture. A preliminary study of the agricultural censuses that had been taken disclosed that of the 200 countries, large and small, listed by the institute, only 60 had ever taken such a census, that since 1900 less than 40 had taken an agricultural census, and that by mere chance not more than 3 countries had taken their censuses in the same year, and no 2 were alike.

A census program and standard form of questionnaire were prepared and were revised by two international committees of statisticians and approved by the general assembly of the institute early in 1926. Immediately thereafter the directors of the institute's census personally visited the capitals of all countries, except Persia, Afghanistan, and Bolivia, to discuss with officials of agricultural and statistical departments, the details of the proposed census and to obtain their promise of cooperation.

In November, 1928, the census program was adopted by the International Diplomatic Conference on Economic Statistics at the League of Nations with the additional recommendation that the census be repeated every 10 years. The census was completed in a few countries last winter and will be completed in most countries in 1930. As soon as available results will be incorporated in the Monthly Bulletin and Yearbook of the International Institute of Agriculture. When all are completed it is planned to publish the results in a single volume, together with copies of laws, regulations, instructions, questionnaire forms, and brief outline of methods for each country.

This is but one illustration of how the International Institute of Agriculture is constantly promoting the standardization of international statistics. Problems of agritechnique and economics are less susceptible of standardization, but even in these fields the questionnaires that go out periodically from the institute to the member Governments of the world concerning organization and funds for research work, plant and animal pests and control measures, agricultural education, standardization and grading of farm products, agricultural credit and insurance, farm labor and standards of living, all tend to bring about a higher degree of uniformity and standardization of methods, organization, and results.

SOME PROBLEMS OF THE SMALL HOUSE

Minimum Standard of New Construction Raised in Last 10 Years

By James S. Taylor, *National Bureau of Standards*

The technical, financial, and personal problems that arise in the construction of small houses are many and complex. These problems involve decisions regarding location of lot, style of architecture, engineering design, materials of structure, arrangement of rooms, and numerous other points.

The varying incomes, needs, and tastes of individual families as well as differences in climate and local custom must be considered in choosing the location for a house. Other factors are: Public measures, such as control of subdivision layout, and zoning and building-code regulations; transportation and educational facilities; temporary or permanent occupancy of the house; and the street, sidewalk, and other utility improvements that may have been or will be made in the vicinity.

The style of architecture may be influenced by the custom or practice of the locality, the financial resources of the builder, the relative permanency of the house, and the education, tastes, and preferences of the family. The size of the house should be determined by the number and convenience of the family. The durability of a structure, its resistance to storms, varying temperatures, wind, fire, and encroaching rodents or insects are largely dependent on the materials used and the methods of construction. A substantial foundation is the first requisite. Adequate floor joists, well bridged; flooring; millwork, including doors, windows, stairs, and trim, are other important elements of the structure. Masonry, insulation, and painting should all be considered.

Interior arrangements.

The arrangement of rooms in a house is largely a matter of family preference and convenience, but certain standards should be followed, in order that the house may be readily sold or rented should such action be necessary. Not only the size of the rooms, but their number and layout, with respect to privacy, arrangement of furniture, convenience and economy for housekeeping, and the routine of daily life, forms of entertainment, and social relationships of the family must be considered. In short, the person who builds a house should not build it for himself alone, nor exclusively for his family, but for the convenience and comfort of all who may eventually dwell therein.

Notable advances in domestic architecture have been made in the last 10 years; the minimum standard of new construction has been raised; a large proportion of old dwellings have been rehabilitated with modern plumbing, electric lighting, central heating, and other improvements; and hundreds of zoning ordinances have been enacted to protect the home neighborhoods of millions of families from uneconomic intrusion of business and industrial uses of land.

But the opportunities for further development are extensive. Well-built houses, houses that are sound in structure, well planned and well balanced throughout, are the foundation of advance in housing standards. The several hundred million dollars spent each year for maintenance, remodeling, and modernization of existing dwellings could be used to greater advantage if applied with more regard to soundness of structure and good layout. Opportunities for improving houses are greater in scope and variety and possibility of rapid advance than ever before, for the products of modern invention and mass production are now available in many different forms for building, equipping, furnishing, and decorating houses.

FRANCE STANDARDIZES HIGHWAY SIGNS

Highway Markings Must Conform to New Standard Specifications

A series of 13 important road signs, standardized as to form, size, and color, have been approved by the French Ministries of Interior and Public Works, and the prefectures of all departments have been advised that highway markings must conform to the standardized specifications, according to a dispatch received from the assistant automotive trade commissioner, H. C. Schuette, of the Department of Commerce, at Paris, France.

The new standardized markings cover signs showing directions and distances; turns, railroad crossings, entrances into towns, etc. The sizes of the lettering, colors, dimensions of the signs, donor's name, height from ground, and other details are specified.

The signals committee which studied the problem and made recommendations to the Government, was composed of representatives of touring clubs, automobile associations, the National Tourist Office, and the French Automobile Chamber of Commerce. In arriving at their conclusions, account was taken of the dimensions of a large number of signs already in use which were donated by a tire company and which have already been standardized, thus obviating the necessity of spending a large sum of money for the erection of new signs.

BALL-BEARING STANDARDIZATION

International Activity Leads to Broader Scope of the Society of Automotive Engineers Work

Since the sectional committee on ball-bearing standardization was organized by the Society of Automotive Engineers and the American Society of Mechanical Engineers under the procedure of the American Standards Association, in 1918, its work has become largely international in scope and has been based very largely on that of the ball and roller bearings division of the S. A. E. standards committee.

In January, 1930, a report on single-row radial ball-bearings of the light, medium, and heavy series was approved and is one of the first American Standards of this kind that has resulted from international agreement. With this standard as the basis, the S. A. E. ball and roller bearings division has reviewed the present S. A. E. standards for the separable (open) type, that is also referred to as the magneto type of bearing, and the S. A. E. standard angular contact type of bearing, and to bring them into agreement with the new standard for the single-row radial bearings.

A new project before the ball and roller bearings division is to recommend a definite standard for a narrow, light series of annual ball bearings for use where restricted dimensions and light weight are of greater importance than the load capacity of the bearing. One of the more important classes of apparatus for which these bearings are used in aircraft engines and data and suggestions from the aircraft industry were accordingly secured for the attention of the division. A subdivision report is being circulated for general approval or constructive comments by the industry before the division recommends any definite specification for adoption.

Metric thrust ball-bearing project.

One of the projects that has been under consideration for international agreement is metric thrust ball bearings. This subject was referred to the ball and roller bearings division by the sectional committee on ball bearings. This type of bearing is used to a very limited extent in the United States as compared with European countries. Because of the appreciable differences in practice in America and abroad, it does not seem to the division at present that it will be practicable to make all the changes in American practice that would be necessary to meet the proposed standardization of this type of bearing abroad.

A subdivision report on standardization of adapter-sleeve bearings for both American and English inch-dimension shafts and for metric shaft sizes has been submitted for comparison with a proposal for an international standard received from abroad, through the International Standards Association. These bearings affect primarily line-shaft installations and are not of such direct importance to the automotive industry as other types.

Other proposals.

A subject before the division and the American sectional committee is the standardization of taper roller bearings on an international basis. A tentative proposal, submitted from abroad to the American committees, includes a series of taper roller bearings made to metric dimensions to interchange with standard ball bearings. As very few bearings of this type are made in America, the division and the sectional committee do not know to what extent standards for this type of bearing can be established in the United States. No information has yet been received from abroad regarding standardization of these bearings made to inch dimensions.

A project of rather far-reaching importance to the automotive as well as other mechanical industries in the United States is the standardization of general-purpose electric-motor frame dimensions. One of the related problems is the standardization of antifriction bearings for this class of apparatus. The recommended practice for ball and roller bearings was formulated largely for use in electric motors and based on the previous S. A. E. standard for wide-type bearings.

The next step in this program, as requested by the electrical industry, is to establish a definite series of bearing sizes for the series of electric-motor frame sizes, and to recommend definite limits for shafts and bearing housings so that bearings for electric motors shall be completely interchangeable. The division and sectional committee are working on this problem and will probably prepare at least an informal recommendation as soon as a definite report on electric-motor frame dimensions has been finally approved. Somewhat related to this is the proposal to standardize the bearing lock nuts and washers that are used for many installations. A subdivision of the ball and roller bearings division has been appointed to work out this problem with the several bearing manufacturers.

A canvass made recently, among bearing manufacturers in the United States regarding their nomenclature for various types of bearing and the component parts for them, indicated some variation in the terms used but not sufficient to make a standard nomenclature impracticable. A subdivision report on nomenclature for ball bearings is being circulated and a supplementary report for roller-bearing nomenclature probably will be submitted later this year.—*S. A. E. Journal.*

STANDARD SYSTEM OF ACCOUNTS

New System Aims to Insure Solvency Among Independent Grocers

Twenty minutes' use a day of "Standard System of Accounts for Retail Grocers" might be sufficient to save the independent grocer from insolvency, in the opinion of the allied food committee of Louisville, Ky., according to the chief of the domestic commerce division of the Department of Commerce, H. C. Dunn.

Just completed by the allied food committee, and growing out of the recent retail grocery survey conducted by the Department of Commerce, the new system of account keeping is based on the needs of the independent grocer and is designed to make possible adequate records in order that the profit on each commodity, the cost of each service, and the value of each customer may be determined at a glance, stated Mr. Dunn.

It was explained that the system consists mainly of a newly designed journal and a ledger embodying a simple but highly efficient arrangement. Seven main types of grocery purchases are covered in as many separate sections of the journal. Space is provided for all data relevant to the cost of the product, such as source of supply, amount of purchase, and various expense items.

By footing the columns of the journal daily, an operation requiring a very few minutes, and carrying the totals to the corresponding columns of the ledger, highly valuable records are claimed to be kept with a minimum of effort, it was said. Expenses are broken down for the merchant into several main groups—delivery, equipment, labor, stationery and supplies, water, heat and light, rent and repairs, advertising, taxes, and general expenses. A monthly record of accounts payable and accounts receivable is also provided.

It was pointed out by Mr. Dunn that printed sets of instructions accompanying each set of record sheets indicate for the grocer type of entries included under each heading and also make for comparability of figures as between different stores, so that the results obtained may be judged on the basis of records of other merchants operating under like conditions.

Many practical applications of the survey findings, in addition to the system of accounts just developed, have been reported to the directors of the survey. Outstanding among these, he said, have been those of local credit men's associations, national wholesale grocery assistants, and hundreds of retail grocers, who have remodeled their stores or improved their merchandising methods.

SCREENS AND SCREENING PRACTICES AS APPLIED TO THE GRADING OF ABRASIVE GRAINS

At the general conference on the simplification of abrasive grain sizes, held at the National Bureau of Standards on May 8, a special committee to conduct research into screens and screening practices applied to the grading of abrasive grains was appointed. This committee held its first meeting from June 23 to 26 at the bureau. Numerous tests were run on various samples of grain and a number of sieves measured and inspected through the microscope. It was the consensus of opinion of the committee that, as a result of its preliminary studies, the aperture sizes of the openings in the screens, even though they were within the required limits to be certified by the National Bureau of Standards, had a direct bearing on the amount of grain passing through; that is to say, two screens, both meeting the present necessary requirements to be certified as a certain size screen, might vary slightly within the tolerance and still give results which varied from 25 to 50 per cent. As a result of the preliminary studies the committee is going to take further steps to ascertain the extent of possible variation in screen results.

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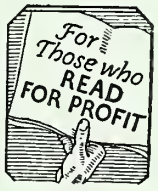

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—President Hoover, at the laying of the corner stone of the new building of the U. S. Department of Commerce, June 10, 1929.

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